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ABSTRACT

These selected papers are organized into four categories: general environmental concerns, general environmental education, environmental education programs, and environmental education materials. Altogether, the reports provide environmental personnel with current information on the present and proposed future status of environmental education. Topics covered in these papers include descriptions of environmental education programs at all grade levels throughout the country, discussions of instruction materials available to educators, and status reports on the quality of the environment and environmental education. Some of the papers include a list of references, as well as sample materials. (MA)

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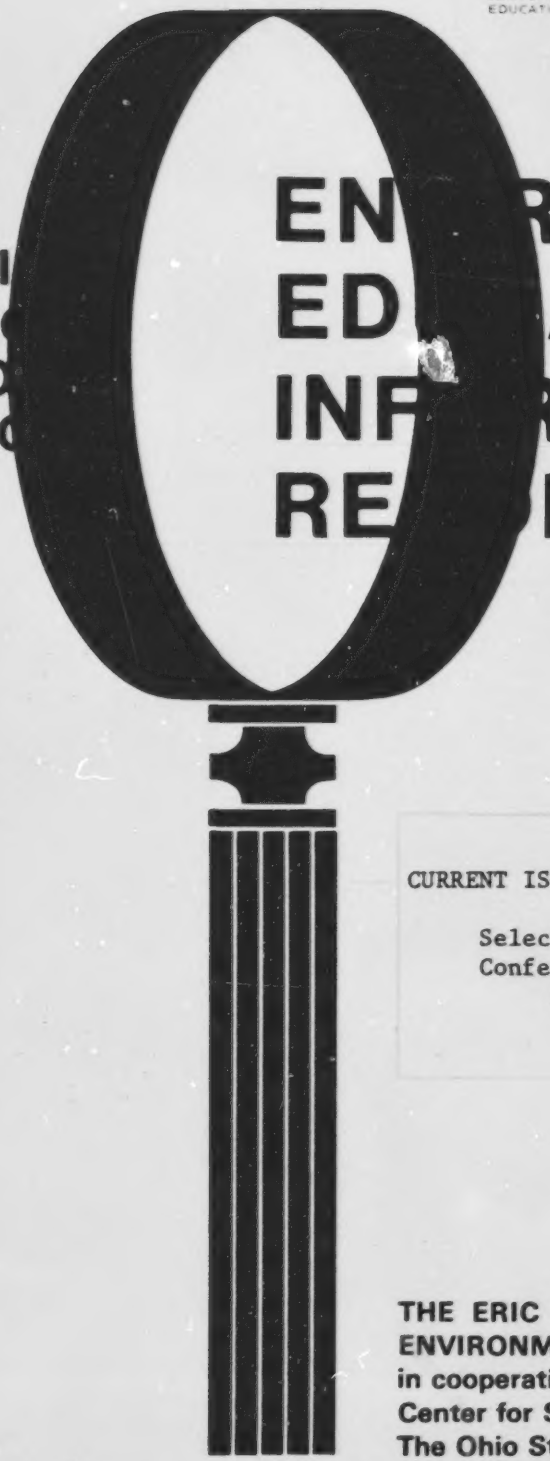

EN RONMENTAL ED ATION INF RMATION RE RT

CURRENT ISSUES IN ENVIRONMENTAL EDUCATION - 1975:

Selected Papers From the Fourth Annual Conference of the National Association for Environmental Education

THE ERIC SCIENCE, MATHEMATICS AND ENVIRONMENTAL EDUCATION CLEARINGHOUSE
in cooperation with
Center for Science and Mathematics Education
The Ohio State University

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Edited
by
Robert Marlett

The National Association for Environmental Education
5940 Southwest 73rd Street
Miami, Florida 33143

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Published by
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Columbus, Ohio 43212

ENVIRONMENTAL EDUCATION INFORMATION REPORTS

Environmental Education Information Reports are issued to analyze and summarize information related to the teaching and learning of environmental education. It is hoped that these reviews will provide information for personnel involved in development, ideas for teachers, and indications of trends in environmental education.

Your comments and suggestions for this series are invited.

John F. Disinger
Associate Director
Environmental Education

Sponsored by the Educational Resources Information Center of the National Institute of Education and The Ohio State University.

This publication was prepared pursuant to a contract with the National Institute of Education. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official National Institute of Education position or policy.

FOREWORD

This collection of papers was originally presented at the 1975 annual conference of the National Association for Environmental Education in New Orleans. It represents a cross-section of the research and teaching interests found in NAEE. The eclectic nature of environmental education deals with an extensive assortment of subjects and this disposition is reflected in this publication.

The topics included classroom materials for environmental education, environmental economics, and sociological myths, to name a few. Contributors vary from those in elementary school classrooms to those in universities; from those in public agencies to those in industry.

Although NAEE has been actively involved in publishing, this collection represents the Association's first publication based on the annual conference papers. The initial response to the request for conference papers was encouraging. It is hoped that these papers will be helpful in stimulating a growing effort to share ideas and interests in environmental education.

Representative papers were selected relative to their contribution in four generic divisions: general environmental concerns, general environmental education, environmental education programs, and environmental education materials. Though all the conference papers submitted could not be included in this publication because of space limitations, all contributions were appreciated. Special thanks go to all those whose efforts promote environmental education.

The Association wishes to express its appreciation also to the ERIC Center for Science, Mathematics and Environmental Education for sponsoring this publication.

Robert Marlett
Editor

September 1975

THE FOURTH ANNUAL CONFERENCE
OF
THE NATIONAL ASSOCIATION FOR ENVIRONMENTAL EDUCATION

The Fourth Annual Conference of the National Association for Environmental Education was held at the Fontainebleau Hotel in New Orleans, April 27-29, 1975. The conference theme was "Improving the Quality of Life through Better Use of Energy and Resources". Dr. John Sheaffer, President, Bauer, Sheaffer and Lear, Inc., Chicago, Illinois, keynoted the conference with an address on alternative technologies that would reduce pollution and consumption of fossil fuels and positively affect both the quality of the environment and the quality of life.

Individuals in attendance were from thirty-four states and three Canadian provinces. Approximately seventy presentations were made including research papers, mini-workshops, seminars, project reports and symposia in three categories: Education, Issues, and Agencies and Organizations. Presentations dealing with education included new approaches in curriculum design and implementation, instructional methods, materials, techniques, and teacher education. Presentations on issues focused on a wide range of topics such as energy, food supply, land use and resource development. Analysis of the contributions and role of several agencies and organizations, other than schools and universities, comprised the third program element. Media presentations, environmental education materials exhibits, a field trip, a Board of Directors meeting, and a business meeting were also included in the conference.

The 1975 conference was characterized by a high level of quality and enthusiasm, demonstrating development of the profession over the short history of the National Association for Environmental Education. The papers included in this volume were selected from the conference and are presented to the community of environmental educators as a means of fostering continuing dialogue and discussion on a variety of subjects directed toward improved environmental education for people of all ages.

The quality of the conference was due to the hard work and dedicated support of the NAEE Executive Committee and the 1975 Conference Program Committee. Special thanks is in order to Bonnie McCabe; her attention to detail both at the NAEE Office and in New Orleans was vital to the success of the conference.

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KEYNOTE

IMPROVING THE QUALITY OF LIFE THROUGH BETTER USE OF ENERGY AND RESOURCES

John R. Sheaffer
President
Bauer, Sheaffer and Lear, Inc.
Chicago, Illinois

If we are to improve the quality of life in modern society, we need to make better use of our energy and resources. One reason for our failure to manage our energy and resources is a lack of understanding of what the future could be. In general, our limitation reflects a lack of understanding, not a lack of technology. Thus, an information gap prevents us from realizing some of the potential benefits that would accrue from better management of energy and resources. Environmental education can play a central role in mitigating this information gap.

Environmental education provides us with an opportunity to help students put their world back together again. Through the discipline approach, we tend to pull the student's world apart, compartmentalizing it. Environmental education, on the other hand, has the potential to help students see the unity of their world and the interrelationships that cement it together.

There are two general approaches to environmental education: the Biological approach and the Resource Management approach. I am going to emphasize the Resource Management approach. This approach will be illustrated by presenting the basic principles on which it is built and several examples of resource management opportunities. Estimates on some of the environmental impacts are presented to give some indication of their potential to influence our quality of life.

The closing section of this paper is a discussion of factors which mitigate against a resource management approach to environmental problems. This discussion helps to focus future environmental education efforts.

Basic Principles

The Resource Management approach to environmental education is built upon three basic principles.

The first principle is that air, land, and water are components of a single, interacting, environmental system. This environmental system affects and is affected by the human occupants in it. Some ecologists state that everything is related to everything else.

The second principle that undergirds environmental education is, for all planning purposes, that this environmental system is a closed system. Everything has to be someplace; and we need to ask where the unwanted things -- wastes -- are going to be, and in what form, no matter how complex the technology is. If we communicate this principle in our environmental education programs, we will be preparing our society to ask the proper questions regarding proposed programs that will impact on environmental quality. This will help avoid programs (which are labeled as solutions) which relocate the problem or change the nature of the problem. Our society has spent many years and wasted many national resources in

pursuing solutions to environmental problems, only to find that our efforts were for naught. The catalytic converter, created to control automobile emissions, is an excellent example of such a failure.

The third principle, and perhaps this is the one that really falls on us as educators, is that pollutants are simply misplaced resources. In this context, when we discuss pollution and environmental quality, we discuss it in a positive sense. In other words, we look at pollutants as misplaced resources. In taking a positive approach to sewage, we establish the major elements contained in sewage and estimate their economic value. Until our perception of sewage is in terms of the chemistry of a resource rather than emotional hang-ups, we are not going to solve our water pollution problems.

Resource Management Opportunities

At present we are losing ground in our efforts to become self-sufficient in terms of energy. For example, in the four-week period ending March 21, 1975, the United States consumed an average of 18,857,000 barrels of oil per day. In the previous year for the same four-week period the amount of oil we consumed per day was 16,208,000 barrels. So in terms of dependence on foreign oil imports, we are worse off than we were before there was widespread awareness of the energy crisis. We are not making progress in our efforts to become energy independent.

To become independent, we must begin to consider some basic changes. There is more to be done than simply turning the thermostat down and reducing the number of lights. While these actions are laudable, we have to consider some basic changes in the systems which serve our society.

The Use of Wastewater

An example of such a change would be to use the wastewater from our cities to irrigate and fertilize our farm lands. In essence, users should return to the land what was taken from the land. The feasibility of such an approach is demonstrated in Muskegon County, Michigan, where all of the wastewater from the urban areas (13 political units) is collected and pumped 11 miles to a suitable site. Here the wastewater is treated to avoid nuisance conditions, stored during the non-growing season, disinfected to control pathogens, and then used to irrigate and fertilize 6,000 acres of farm land. The system began storing wastewater in May 1973. In its first cropping year, 1974, 2,500 acres of corn were harvested and sold for $371,000.

In our modern society, sewage treatment is generally considered an expenditure. The Muskegon approach is beginning to change this perception. The Farm Advisory Group, established to guide the agricultural operation at Muskegon has estimated a harvest of 450,000 bushels of corn in 1975 (the second growing season). The group further reported, "If all land is planted we should do even better. This will be truly land disposal of wastewater, the recycling of a valuable resource". At today's corn prices, Muskegon County should realize more than one million dollars from its sewage flow during 1975.

Analyzed chemically, the annual flow of wastewater from public treatment systems contains nitrogen fertilizer. To replace the fertilizer requires the equivalent of 2.25 billion gallons of crude oil. In other words, the nutrients in our wastewater when discharged into our rivers and lakes, stimulate plant

growth in the water which results in water pollution. To further perpetuate this degradation of water quality, we import oil and natural gases to make anhydrous ammonia for use as fertilizer to replace the nutrients that were taken from the land and eventually end up in our water.

If this wasteful practice were stopped and all of the nutrients in our wastewater were used to stimulate plant growth on land, we could reduce our oil consumption by two percent. A two percent reduction is significant from a national vantage point. The reason we are not accomplishing such savings is because of the inability of our society to think of sewage in terms of chemistry. We have not been taught that what comes from the land should be returned to the land. We must be taught the meaning of completing the cycle.

Management of Water Use

Another opportunity for change is the management of water use or water conservation. At the recent National Conference on Water (April 22-24, 1975), the present rate of water use was seriously questioned. It was suggested that there is no need for the nation to use 200 gallons of water per capita per day. If our daily use was reduced to 100 gallons per capita, extra water would be available for our urban areas, and pumping and chemical costs would be reduced substantially. Also the need to invest in the expansion of water supply systems would be reduced. The Federal Water Pollution Control Act Amendments of 1972 in Section 104 (o)(1) states that:

> "The Administrator shall conduct research and investigations on devices, systems, incentives, pricing policy, and other methods of reducing the total flow of sewage, including, but not limited to, unnecessary water consumption in order to reduce the requirements for, and the costs of, sewage and waste treatment services. Such research and investigation shall be directed to develop devices, systems, policies, and methods capable of achieving the maximum reduction of unnecessary water consumption."

To date, there is little evidence of the results of this research. Yet, there is a vast amount of available technology that, if applied, will reduce significantly the amount of water a household uses. New housing units can be built as water conservation units. Such housing units will contain faucets with small orifice openings, flush toilets with tanks that hold 2½ instead of 10 gallons, and even-pressure heads on the showers. Taken together, these plumbing changes have the potential to reduce the water use in a typical household by 50 percent. This reduction in water use could be accomplished with no perceivable effect on living standards. The average person would not be able to perceive whether he were living in a water-conserving house or a water-wasting house. Opportunities to achieve such reductions in water use need to be communicated. An aroused public opinion is needed to force changes in building codes so that these conservation measures will be required in every city in the United States.

Bio-Gas Plants

Another opportunity for change is the development of bio-gas plants. The environmental insults -- air pollution, odor, and water pollution -- associated

with feed lot wastes have been documented. Also, there is widespread awareness of available technology to produce methane gas from these waste materials in anaerobic digestors. If this were done with the readily assembled feed lot wastes, two percent of our energy requirements could be met by gas generated from renewable sources (animal feed lot wastes). The multi-benefits of the approach are obvious: odor control, water pollution control, methane gas production, and the production of a stabilized organic material that is usable as a soil conditioner and fertilizer.

It is interesting to note that Mahatma Gandhi advocated such an approach for India more than 40 years ago. He stated that the dung from India's 220 million head of cattle could be exploited to provide an inexhaustible supply of cooking fuel and fertilizer. Essentially, Gandhi was advocating placing the cattle dung in small bio-gas plants (anaerobic digestors) to produce methane gas for fuel. The stabilized organic residual matter would then be used as a soil conditioner and fertilizer. Unfortunately, this suggestion was greeted with derisive laughter and did not get the degree of acceptance as did his suggestion to develop home industries.

Modern India, instead, embarked upon a program of nuclear energy and chemical fertilizer production. Now faced with millions of starvation deaths amid a fertilizer shortage, Indian scientists have quietly begun to acknowledge Gandhi's wisdom. The government has proposed a crash program to set up 20,000 cow dung methane gas plants in various rural towns. An analysis has shown that investments in such facilities will produce three times more power than will a similar investment in nuclear facilities. Other scientists see the gas plant scheme being extended to include human excreta - a boon to places without sanitation facilities and prone to epidemics. One scientist observed that "With 550 million people and 220 million cattle in this country, we would have a situation where there would be a fertilizer and fuel surplus".

Agricultural Use of Sludge

Another basic change to be evaluated is the use of stabilized sludge from municipal sewage treatment plants as a soil conditioner and fertilizer. The Metropolitan Sanitary District of Greater Chicago is pioneering in this area. To date, more than four million wet tons of sludge have been moved to strip mine and agricultural areas in down-state Illinois where it is used as an agricultural resource.

There have been some problems with this program. To a large degree, these problems reflect education, an education which incorporates a strong bias against wastes. Odors are detected subjectively and are frequently cited as the problem.

In one community, an effort was made to evaluate odors; a panel of "sniffers" was assembled. The first substance to be evaluated was distilled water. All of the panelists found it to have an odor ranging from a slightly bad odor to a severely bad odor. Odor evaluation is a personal matter.

When a plan is formulated to use stabilized sludge as an agricultural resource, the issue of odors is certain to be raised. In the Washington metropolitan area, Prince George's county opposed a sludge management program at the Beltsville Agricultural Research Center because the county was not going to be the outhouse for the metropolitan area.

When the use of stabilized sludge as an agricultural resource is proposed, the

issue of viruses is raised. This is surprising since we do not even monitor our drinking water for viruses. Also, questions regarding heavy metals and toxic effects are raised. Those persons knowledgeable in the field focus on the potential problem with cadmium. Novices discuss lead and mercury. In general, uninformed discussions are given on the amounts of heavy metals that are found in nature. The questions relating to viruses and heavy metals should not be ignored or passed off in a flippant manner. Rather careful planning is required to prevent problems from occurring.

Efficient Automobiles

Another opportunity for change is the type of engine used in automobiles. For years the Department of the Army has been researching engines to improve fuel economy. The reason the Army was interested was quite simple. More miles per gallon make a better Army truck (other things being equal) because 60 percent of the material taken into the battle field is fuel. In 1970, the Army was experimenting with jeeps equipped with fuel-injected stratified-charge engines that were getting 24 miles to the gallon and which met the 1976 emission standards called for in the 1970 Clean Air Act.

Obviously, it is possible to build automobiles that get 24 miles to the gallon which meet desired pollution emission standards. However, the automobile industry chose not to develop new efficient engines. Rather it chose to attempt to control emissions through add-on devices -- exhaust gas recirculation and catalytic converters.

The fuel-injected stratified-charge engine has the potential to get 24 miles to the gallon and meet the 1976 air quality standards. In this light, why not mandate efficiency performance standards for the automobile industry so that all cars sold will be efficient and thus clean? The implications of such an action are far-reaching. The exhaust emissions in our cities would revert back to the point where they were when we had half as many cars. Our use of energy would be reduced by 12 percent. This proposal in itself would reduce dramatically our need for imported foreign oil.

Why is there not widespread demand for such actions? Simply because in our planned obsolescence society, we have difficulty comprehending concepts of efficiency. Many of our new environmental textbooks and teaching aids promote add-on technology rather than efficiency as the means of coping with pollution emissions into the air. It was such add-on technology that reduced the miles per gallon performance of new cars.

The three principles outlined in the beginning of this paper dictate the way to clean air is through the development of more efficient combustion system, reducing the weight of the vehicle by the incorporation of lighter metals, and the reduction of wind resistance through aerodynamic styling.

Solar Energy

Solar energy is another resource management opportunity which is generally ignored. It has been claimed that from 50 to 90 percent of our current space heating and cooling needs could be met with solar energy. However, an analysis of traditional education materials shows solar energy as an option for the year 2020. The potential to install solar systems today is evident from the success of the National Science Foundation's RANN program which succeeded in getting

solar heating systems installed in four schools in less than 60 days. The new Federal office building under construction at Manchester, New Hampshire, will be equipped with a solar system. A report on the proposed new administration building for the Argonne National Laboratory shows that energy-conserving construction coupled with a solar heating and cooling system will pay for itself in 12.4 years.

With this type of information in hand, new educational facilities should seriously explore the feasibility of serving as a working example of solar heating and cooling systems. If the paycheck period is analogous to that computed for the proposed Argonne Laboratory administration building, the benefits to a school in terms of operating budget are evident. Educational facilities have useful lives greater than 12.4 years.

The draft Energy Resource and Conversion Bill (HR 6860) contains provisions that are designed to promote the use of solar energy. If the bill becomes law, these provisions could have a significant impact on efforts to overcome the effects of the recent economic recession.

Widespread use of solar systems would stimulate three areas of the economy. First, plans and specifications would have to be developed for the solar systems. This would create a demand for scientists and engineers, thus filling the void created by the curtailment of the space program. Second, the component parts of the systems would have to be manufactured. This would stimulate employment in the manufacturing sector of the economy, taking up some of the slack that has resulted from reductions in consumer goods sales. Third, the systems would have to be installed. This would generate employment in the trades for carpenters, plumbers, pipe fitters, electricians, steel fabricators and welders. The tradesmen would be involved not only in the construction of new structures but in the retrofitting of existing structures with solar heating and cooling systems.

What a way to work our way out of the recession - stimulating employment in three sectors of the economy and resulting in cleaner air and less demand on foreign oil imports. We can reduce our energy consumption by 12 percent if we supply 50 percent of our heating and cooling needs with solar energy.

Wind Power

Another opportunity for our society is the development of wind power. There is much talk about windmills but little action. Recent research has lead to an improvement in the conversion efficiencies of windmills.

New innovations have been suggested and patented. One of particular interest is the hillside power plant. In simple terms, such as installation attempts to combine both wind and solar energy in the production of electricity. To develop such a system the hillside is paved with asphalt and a glass covering is placed several feet above the paved area to create an air-space. At the base of the hill the space between the asphalt and glass is kept open, the sides are enclosed, and the air-space narrows as one proceeds up the hillside. The convectional currents generated by the differential heating of the sun flow through turbines that are installed at the top which in turn power generators. It has been estimated that a single installation of this type could produce a significant quantity of power without any emission problems. But there are no working examples -- discussion, but no action. Hopefully, the Ways and Means Committee's energy bill will provide the necessary economic incentives to get the windmills turning.

Solid Waste Management

The issue of solid waste or refuse disposal has several seldom discussed implications. The change from the use of paper, wood, and glass to the use of plastics had resource management, as well as solid waste implications that were not analyzed properly. Paper and wood are made from renewable resources readily available in the United States. Plastic, on the other hand, is made from petroleum and natural gas, non-renewable resources which must be, in part, imported from foreign countries. Glass is made from sand which is abundant in the United States.

From a disposal point of view, paper and wood are biodegradable whereas plastics will persist for centuries. Also, paper and glass are easily recycled whereas plastics are difficult to recycle. As a nation, we need to explore a policy that will specify the use of renewable resources whenever it is possible and reserve the use of non-renewable resources for only those items or activities for which there is no practicable renewable substitute.

In terms of solid waste management, the nation's attention has focused on peripheral items such as non-returnable soft drink bottles. All other kinds of bottles should be included if we are to be consistent. The reason for such action is to preserve space in sanitary landfills. An operator of a sanitary landfill is not concerned about non-returnable bottles. Bottles break up and make good solid compact fill. Of more concern are the plastics which blow from the site and turn the surrounding trees into a bizzare sight: trees shrouded in a conglomeration of plastic remnants.

Our society must strive both to use renewable resources and to maximize recycling. Those materials which cannot be recycled should be used to develop sculptured landforms. The Forest Preserve District of DuPage County, Illinois, developed the first scientifically planned solid waste mountain -- affectionately called Mt. Trashmore -- at their Blackwell Forest Preserve. When the planning commenced on this project, some technical people claimed it could not be done. However, the 150-foot high "mountain" ski hill with its surrounding 80-acre lake is a dramatic testimony to the workability of this approach.

The development of the ski hill and lake paid for itself. There was a dumping fee charge for incoming solid waste and pit run gravel encountered in the lake excavation was sold. The clay excavated from the lake area was used to encase the solid wastes in above-ground cells which formed the building blocks of the "mountain". The synergistic benefits associated with the program prompted Superintendent H. C. Johnson to formulate the equation: garbage + gravel = recreation. In essence, activities at the site, refuse disposal, and gravel sales generated the income that was used to underwrite a part of the forest preserve development costs. Recently, a contract has been signed by the county to allow a private corporation to capture and sell the methane gas produced by the site. The county will be paid a portion of the revenue derived from the sale of the gas. The Forest Preserve District, spurred on by the success of the first Mt. Trashmore, has initiated the construction of two more solid waste mountains.

Unfortunately, the success in DuPage County has not been emulated elsewhere. The primary reason for this failure is the inability for our society to think positively about wastes. The idea of a Mt. Trashmore frequently is communicated as a novel idea, an ecological freak, something which can be done in DuPage County but which will not work elsewhere.

Obstacles to be Overcome

Environmental education has a great challenge: To help Americans gain a vision of what the future could be. It must improve the quality of our urban environment so that citizens will be willing to take positive action. In a situation where green space is vanishing from our metropolitan areas, there is a need to dispel the concept that the only good acre is a developed acre. Should not floodplains be kept open? Should not prime natural recharge areas be kept open to provide benefits to the urban area both in terms of flood control and groundwater supply? Do not unique floodplain ecosystems have a value? These types of environmental values need to be communicated, not as niceties in nature, but as necessities if we are to improve our quality of life.

Needed Attitude Changes

Our failure to implement many resource management programs is related to our attitudes toward wastes and unwanted things. This attitude has been taught. As the song in South Pacific says, "You've got to be carefully taught".

We have been taught to think of wastes in terms of odors; in terms of disease; in terms of low status. We have such a hang-up over human feces that we have coined scores of slang words to use instead.

Our literature and our everyday conversation is filled with references which reinforce our hang-ups, e.g., "down in the dumps" or "a lot of garbage". The idea communicated is that any association or proximity to wastes is second-class and that only poor people produce wastes. This idea was well communicated in the Pulitzer Prize winning novel To Kill a Mockingbird. You may recall that Scout's world consisted of four kinds of people. There were the neighbors like us, the blacks, the Cunninghams out in the woods, and the Ewells who lived down by the dump -- the white trash.

After years of such subtle teaching, it is no wonder why Americans have difficulty in perceiving sewage in terms of chemistry. We have been carefully taught that sewage is bad -- it should be flushed away, it smells, it contains diseases, and any proximity to it will inflict an economic penalty (which completely blots out the fact that the nitrogen, phosphorus and potassium contained in a year's flow of wastewater has a fertilizer value of over 1.5 billion dollars per year). These valuable nutrients go down the drain, so to speak. But to continue to grow crops we need to replace these nutrients. The nitrogen in a year's flow of wastewater requires 2.25 billion gallons of crude oil to replace them.

Our society can turn our wastes into wealth. The major obstacle to overcome is our lack of understanding. Perhaps my generation is a lost cause. If so, the hope for America is to get the vision in the school system right now. To change the attitudes of a whole generation of Americans regarding wastes is to get them to think positively about wastes. To do this presents a problem to the environmental educator, because the environmentalist frequently must work with a number of disciplines. Unfortunately, interdisciplinary contributions are not always recognized by the basic disciplines in the academic world. Thus, mavericks, persons with peripheral interest, and mediocrity are drawn to the environmental field. The mavericks are involved because they see the value of new approaches to environmental matters. The mediocrity which becomes involved as late entries into the field sense an opportunity to carve out a niche for themselves. The persons with peripheral interests are the real problem, however.

Everybody has some interest in environmental matters. This peripheral interest group can always participate by asking questions - questions they know cannot be definitely answered. There is a widespread belief that the safest thing to do is to question.

I used to enjoy playing that role -- being called in as a consultant on a complex problem and raising a series of questions that I knew nobody could answer. Such involvement may appear academic but it tended to cloud rather than illuminate the issue. In those days, I should have been labeled as a sand thrower -- get a lot of sand into the air to obscure vision -- one who injected more uncertainty into the issue. This is not to minimize the educational value of questions, but simply to point out that at some point decisions must be made and those with the most information should be willing to make them. The luxury of such an approach was stripped from me during my term as scientific advisor to the Secretary of the Army. In this capacity we had to give answers as best we could, not phrase additional questions. We were confronted with the problem of how to paint a moving train. We learned to say, "This is my best judgment in the light of the knowledge we now have".

The Problem of Inaction

Simply making high level decisions that call for massive action is not enough. People must be willing to act. Initially, there was a belief that still persists that the way to muster action is to dramatically portray the severity of the problem. In other words, scare people into action. Research into the willingness to act in terms of water quality, air quality, solid waste management, and floodplain management has shown a positive relationship to efficacy, not to the severity of the problem.

The crux of the environmental education challenge is to raise the efficacy of our society in terms of solutions to environmental problems. When this is accomplished, there will be a willingness to act. To illustrate, the Federal Water Pollution Control Act Amendments of 1972 state that,

> "...the Administrator shall encourage waste treatment management which results in the construction of revenue-producing facilities providing for the recycling of potential sewage pollutants through the production of agriculture, silviculture, or aquaculture products."

Although this is the law of the land, there has been little action. As Senator Jennings Randolph observed, "If we are to implement the law, we have to educate the United States to think about wastes in a positive manner". The law is there but it is not being implemented. The challenge is an educational one.

Financing New Innovations

New systems face problems of financing. But here again education can play a role. Many businessmen have children in school. If the children are educated to comprehend the potential for the beneficial uses of wastes the message will get to the businessmen informally. This can help to secure financing by communicating to them the opportunities that exist in new systems. Businessmen know

that no matter how good an idea is it will not be implemented if it cannot be financed.

Assumed Public-Private Conflicts

Another reason why we are not availing ourselves of potential opportunities is the assumption of public-private conflicts. These conflicts have been mitigated as private enterprises and public interest groups come to realize that they are pursuing the same goals. By mitigating the conflict, there is an opportunity to work together and thus solve the problems more quickly. It is significant to note that we are reaching a point in history when we are all trying to do the same thing. This, of course, must be communicated.

The Challenge

There is a need to change the thinking of an entire generation of Americans. We must become efficacious with respect to mitigating environmental problems. We need a vision of what we can have in the United States, not in the year 2020, but in a five- to ten-year period. There is a proverb that says, "where there is no vision the people perish". In this respect, where there is no vision the environment perishes. Environmental education has an opportunity to lay out the vision of what we could have - to generate positive programs.

I leave with you the challenge that education can take focus on one of two roles. It can be a neutral bystander or a sand thrower; raising questions to cloud issues. Or, it can be an activist: formulating visions and laying out positive programs for implementing them. I hope that all of you will devote your talents to the latter approach.

ENVIRONMENTAL EDUCATION PROGRAMS

UNIQUE STATE WIDE ENVIRONMENTAL PROJECT AT SECONDARY SCHOOL LEVEL IN PENNSYLVANIA

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Shippensburg State College received a National Science Foundation grant of $39,980 in support of a Student Science Training Program (SSTP) for high ability secondary school students. The National Science Foundation grants in this area amounted to more than $1.3 million for projects covering 39 states and the District of Columbia. From a total of 79 awards on a national basis, Shippensburg State College received the largest sum awarded to any organization.

This project consisted of a summer program to provide the participants with research experiences that transcend those which are normally available in high school with intentions of integration of similar research experiences into the high school curriculum.

The project brought 50 secondary school students (mostly eleventh graders) and ten secondary school teachers to the Shippensburg State College campus for a period of five weeks.

The secondary school students received undergraduate college credit while the secondary school teachers received graduate credit for their participation in the program. All expenses were paid for both the students and teachers with an additional stipend being provided for the teachers.

The Commonwealth of Pennsylvania was divided into ten regions and five students and one teacher were selected from each region - hence 50 students and ten teachers in the program. The method of selection of participants was based on the following:

1. SAT scores and other types of examinations
2. Class standing and grades
3. Independent study and other projects performed
4. Recommendation of teachers and regional directors

Approximately 200 inquiries were received from ten states. The number of completed applications was over 100. From the 50 finalists, 17 participants were from schools who held memberships in the Pennsylvania Junior Academy of Sciences (PJAS). Approximately 50 percent of the participants were female and six percent of the students were black.

Our plan concentrated on an interdisciplinary problem-solving approach involving the environmental sciences and their social implications. We designated five major research problem areas for investigation: (1) water pollution, (2) air pollution, (3) energy, (4) soils, and (5) land use. Five students and one secondary school teacher comprised one group. Each member of a group pursued one of the five major research areas identified above. In this plan each group prepared one student in each of the five areas. The research problems in environmental sciences were directed and supervised by a team of faculty from the disciplines of Biology, Chemistry, Geography-Earth Science, Mathematics and Physics at Shippensburg State College.

In addition, all participants were given instruction in computer programming, data analysis and computer modeling. Field trips and studies were conducted in the Cumberland Valley and surrounding area and films, speakers, and some social activities rounded out a balanced program.

The first two days of the project involved all-day field trips in and around Shippensburg to provide the students and teachers with an overview of various aspects of the environment involved in the program. Students and secondary school teachers concentrated on one area and were provided with the necessary experiences in how to pursue an investigation which they selected. A special effort was made to have these participants work somewhat independently so that they would get an accurate picture of the nature of research. We feel that these students had a genuine opportunity to test their capabilities and interests in science. The professional staff actively participated in the problem-solving projects and were closely associated at every phase of the development of the research.

While each group of five students and the high school teacher primarily focused on one of the research areas, all teams were brought together at various times throughout the project in order that they could be briefed on what types of activities were going on and how much progress was made in the other groups' investigations. In this manner the participants were able to get an overview of the entire project and all its ramifications.

During the sixth week (following the five-week summer program) an additional 60 secondary school teachers were invited to the Shippensburg State College campus to acquaint them with the summer experimental workshop. The ten secondary school teachers who participated in the five-week program were also held over for this orientation.

A unique feature of this project was the follow-up work. After the five-week institute, the students and teachers continued their research activities at their high schools and also encouraged and helped other students in pursuing research in the broad area of environmental sciences. Our plan was to follow-up their summer experience during the nine-month school year with supervision of the research being directed and supported by the director, the Shippensburg State College staff, and the regional directors as well as the high school teachers who attended the summer program.

Students and teachers were encouraged to deal with environmental problems in the community, and as a result, they came in contact with many citizens and segments of the community in carrying out their work. Thus, in addition to the technical training, there was a broader commitment for these participants - they became involved in public relations as they attempted to make people more aware of the need to deal with the environment more effectively.

Midway through the follow-up program of the 1975-76 academic year, the ten secondary school teachers who attended the five-week summer institute at Shippensburg State College were brought back to the college campus to review the progress of the research and activities of each of the ten regions.

Some objectives of the program were (1) to develop independent study capabilities, (2) to provide exposure to instrumentation and computer work, (3) to study the social implications of research, and (4) to incorporate independent study into the secondary school curriculum.

The program was evaluated by (1) the National Science Foundation with an on-site visitation, (2) an in-house review by the project director and staff, (3) questionnaires on attitude changes, (4) questionnaires on the entire program, and (5) the follow-up work itself.

The National Science Foundation again funded this experimental project for a second year with the second largest grant in the country in this experimental category.

CURRICULUM DEVELOPMENT FOR ENVIRONMENTAL EDUCATION

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Neither a conference room in a hotel such as this nor a standard school classroom is a place for curriculum development in environmental education. Nor can a good program be developed by using slide presentations or motion pictures with appropriate music or by bringing in television as the primary means of education. We all know, children and adults alike, that such presentations can and do use tricks, half truths and other means of persuasion; consequently, we often pay little attention to the message portrayed by the medium.

Rather, good planning must be done in the environment to be studied. For example, I wanted to teach my Human Ecology class about stream pollution and its control. I chose a small fast-flowing stream about three miles long from source to mouth for study. The entire class of about 30 students and I took a supply of sterilized water-sample bottles obtained from the local health department and walked the length of the stream, sampling whenever it seemed appropriate to do so. This procedure occupied one Saturday morning. All of us then took the samples collected to the health department for analysis. We had debated whether we should do our own analysis, but decided to have the proper official analysis done in case we wanted to take action after results became evident.

The health department performed the tests for pollution and explained all procedures to the class. At its source and for the first one-half mile, the stream had no pollutants. Then close to a private, unauthorized dump, the bacteria count rose precipitously. After two miles the water became nearly free of pollution, but then it went past a mushrooming trailer court. At the mouth of the stream just beyond the court, the bacteria count was twenty times the minimum number indicated for pure raw sewage.

Again we held a class discussion about our procedure. We decided to send the results with a strongly worded, scientifically and legally precise letter to the District Health officer with copies to all state and local officials. All of the official names were listed on each copy.

Response was instantaneous! The next day the health department barricaded and padlocked the dump road. Notice was served on the trailer court owner that he must either begin immediately to correct the pollution or close the court. He promptly installed proper treatment facilities.

You can imagine the student response! But more importantly, those 30 people developed (with my guidance) an unforgettable experience in environmental education. As a result, they will be better informed citizens capable of using this knowledge in future action.

Now to go from the specific to the more general: I direct a National Science Foundation supported program in the coordination of environmentally oriented courses K-12 in which 30 teachers, in teams of at least three, come in the summer from not-too-distant school districts. I accept teams of teachers only from districts where an administration has written a letter of support and commitment. These teams have representation from elementary, intermediate, and high

school levels. Six weeks are spent in the study of various projects which were developed under National Science Foundation auspices. These projects include Science Curriculum Improvement Study (SCIS) from K to 6, Outdoor Biology Instructional Strategies (OBIS) and Human Sciences Program (HSP) from 6 to 9, and Investigating Your Environment (IYE) from 10 to 12. Numerous field trips support these studies.

Each team develops a curriculum plan tailored for its school and then when they return home, the team conducts an in-service course with university credit for the teachers in its school. This multiplier effect is an important part of environmental education. Another important feature is the enlistment of help from people such as representatives of the Department of Natural Resources, Health Department, National Park Service, Soil Conservation Service, and other organizations. These people are usually pleased to be asked and can present a variety of ideas. The climax of the summer is a week-long ecology trip with camping gear to Isle Royale National Park. A week is time enough to give them a feeling of being a part of the ecology and not just a visitor.

One other interesting aspect of this program was the return of a group of 30 past-participants for a two-week trip to Isle Royale with tents and typewriters. These people wrote up projects which they had developed and tested in their own schools, and then we published them in a book which we entitled Horse Manure and Other Fun Projects. Anyone who had ever attended one of these institutes in ecology at Michigan Technological University received a copy, and some were also sent to others who requested them.

In conclusion, environmentally oriented systems must be developed in places where the environment being studied can be seen, heard, touched, and smelled with others who have interest and knowledge -- others who are willing, eager, even inspired to educate as many people as possible now. If environmental education is to be believable; if it is to teach values and a land ethic, then curriculum development must be carried out where the learners can see it happen.

ENVIRONMENTAL EDUCATION AT A SMALL LAND GRANT UNIVERSITY

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The origins of my experience began in 1968 when, as a member of the Geography faculty at St. John's University in New York, I approached the Dean of Liberal Arts and a representative sample of faculty from six disciplines on the subject of establishing a new undergraduate degree-granting program offering both the B.A. and the B.S. in Environmental Studies. We were blessed with a most enthusiastic administration and a cooperative corp of young and some older faculty who assured us certain, if not speedy, success in our truly interdisciplinary effort -- an effort which ignored no discipline or department. Four years, about $8,000, and a hundred or more committee meetings and planning sessions later, our Environmental Studies Program was officially launched. Every department was invited to participate, most contributing at least one course, some giving partial faculty time, and all agreeing to cooperate to enable our majors and our effort to succeed. I especially want to point out that the attitude of the faculty of established departments was not one of institutional jealously or fear of competition from the student market, but rather they viewed us as a vehicle by which they might accomplish many of their own goals of achieving greater relevancy in their courses and stimulating more majors in their own disciplines. Hence, our whole effort was a most positive one and was viewed positively by the traditional disciplines. At this time, the St. John's program has 55 majors and is under the direction of a plant ecologist.

However, my purpose here is to speak of our efforts at the University of New Hampshire, where I am presently coordinator of the undergraduate Environmental Conservation program. While my earlier experience in a private liberal arts college in New York taught me that an interdisciplinary environmental studies program can be promoted as an enhancement of already existing traditional curricula, my land grant university experience in New Hampshire teaches that a good solid curricular framework in the natural resource and ecological areas likewise enhances the chances for success of an interdisciplinary environmental program.

Notice I use the word <u>interdisciplinary</u> rather than <u>multidisciplinary</u>. Multidisciplinary carries the correct connotation of "many disciplines", but interdisciplinary carries the stronger connotation of an interaction between and among these disciplines. It is this <u>interaction</u> which is the core of our work.

In the mid 1960's a broad-minded forestry and wildlife faculty in a forestry department not dominated by special interests decided to offer a broad environmental conservation course for the benefits of non-majors who were interested but who could not otherwise enroll in forestry courses. This rapidly became one of the largest, most popular and most talked-about courses on the campus. This widespread and positive university reaction to this course led the forestry and wildlife faculty to consider consolidating their efforts with two other small environmental departments: resource economics and soil and water science. Each of these departments was quite small, facing difficulties of survival, and in turn, most anxious to amalgamate with forestry. Thus was born the fledgling Institute of Natural and Environmental Resources under one umbrella. Already offering five degree programs (forestry, wildlife management, soil science, hydrology, resource

economics), the new institute quickly gave rise to two much more interdisciplinary type curricula: community development and environmental conservation. It is the latter curriculum which I coordinate and am responsible for. This curriculum was, as you might suspect, a natural outgrowth of the institute's effort, being the only truly interdisciplinary program and the only one representative of all the other areas.

The establishment of the institute resulted in the professional forestry and natural resources faculty becoming much more involved in the broad academic life of the university and the lives of the students, and it gave the university community much greater and more open contact with the professional foresters and resources people. Likewise, the development of the environmental conservation curriculum has enabled many students who are not narrowly interested in the professional-technical requirements of forestry to still enter the academic area of natural resources, while the program serves as a mechanism to protect these professional resource curricula from over-dilution with only marginally interested students.

So what of our Environmental Conservation program? Let's devote the remainder of our time to this topic, which is central to our interests. Our program might be considered a disciplined general education, a liberal arts program with a natural resource conservation and ecology emphasis. We're a cross-campus program, being much involved with almost all of the traditional liberal arts disciplines. Our program setting is well structured, having been spawned from a solid framework of established natural resource disciplines, and yet it is perhaps the most flexible degree program at our university, with maximum room for student design based on the student's interests and needs. Hence, we are a very costly program in terms of advising, if less costly from the viewpoint of class time. I might add at this point that our flexibility has enabled us to attract and hold over 150 majors, in spite of no advertising until last month when we produced our program brochure. About half of these students are women.

Our small core of required courses includes a minimum of 16 semester hours in the biological sciences, at least half of which must be in ecology. Most students go beyond this in ecology. Also included are an eight-hour minimum in resource economics, eight hours in natural resource policy and conservation issues, and an introductory course in fresh water resources. Beyond this point, student input enters the picture.

Each student is asked to carefully design an eight-course option in some area related to environmental conservation reflective of the student's interests. This option is an ideal tool which the student can use to learn a skill or otherwise consolidate his or her interests within conservation, so as to improve prospects for employment or graduate school admission. The option is not meant to reflect an additional interest of the student in another subject area. Such interest can be fulfilled in a minor, which is also available to the interested student. The eight courses in the option may be drawn from as many as eight different departments, though more commonly, three or four. For example, a student might design an option in mass communications, a clear and valuable tool in the environmental conservation field. He might thus take writing and journalism in the English Department; public speaking, debate, radio and television broadcasting from the Speech and Drama Department; public relations from the Business School; and media techniques from the Department of Education. Or, a student might design an option in ecology, drawing courses from the departments of Botany, Zoology, Forestry, and Microbiology. Other examples of student-designed options include land-use planning, environmental education, air and water pollution,

soil and water conservation, statistics and computer sciences, business and pre-law (in preparation for law school). As you can imagine, the option aspect of our program puts a great advisory burden on our faculty and is one of the most costly aspects of our program. It involves many faculty hours on a one-to-one basis with our students, but we at New Hampshire cherish our advisory responsibilities and proudly boast that we are one of the few state land grant universities providing maximum faculty-student interaction on this level. The success of our Environmental Conservation effort depends heavily, therefore, on faculty willingness to advise, assist and guide the students toward their career goals.

The other major characteristic of our program I want to mention is the required student practicum. This is a mandatory practical working experience, not to be confused with a research project, and is somewhat like an internship on a small scale. We require that the student spend his fall semester of his senior year engaged in this activity on a part-time basis, for which he receives four credits. The student may choose a position with our approval, or we can place the student in the position. We do not permit the student to earn anything more than a nominal salary, nor do we permit the student to work in a private business or for any kind of profit-making concern. The position must be with an environmentally oriented government agency (on any level -- local, state, federal) or with a non-profit environmental organization, local or national. We have placed many students with New England area conservation organizations such as the Audubon Societies, and with regional planning commissions, town conservation commissions, and various federal agencies like the U. S. Forest Service and the National Park Service, not to mention state agencies like Fish and Game Departments. The work performed varies, but in all cases the student gains an invaluable inside experience learning the day-to-day workload and activities, and often the financial and other problems facing their employers. We do not question the learning value of our required student practicum, for we know it is very great.

A word on jobs and employment.

We do to great lengths in our program to inform our students and potential students that essentially we are <u>not</u> a vocational or job-oriented program. We're preparing students to become an understanding public, to bring an environmental consciousness into many different fields. We are not a professional or training curriculum -- we are a liberal arts and academic program.

The actual career situation into which our students enter depends largely on the design of option a student makes, the option often being the key to jobs or graduate school. Design of certain options will place a student in demand on the job market, while poorly thought-out designs or design of an option in a particularly tight field may very well lead to unemployment. Hence, again there is somewhat of a burden on the advisor in assisting the student. And many of our students will further require more specialized training in graduate school, which requires further advising.

There are, however, two career fields for which our graduates are particularly well qualified, regardless of their choices of options. The first of these is regional planning, in the context of the work of regional planning commissions and state and municipal planning agencies, all of which have hired our students on a part-time and summer basis. Graduates of a curriculum such as ours are uniquely qualified to fulfill the very broad environmental needs of regional planners - people who are capable of integrating all environmental elements,

economic and ecologic, social and political. In this unique sense, our graduates, as many of yours, are narrowly trained to understand the linkages and the systems within which the various parts fit into the environmental whole. Comprehensive planning requires this - curricula such as ours provide it.

The other growing career area for which our graduates are especially well qualified is within the ranks of the rapidly developing environmental consulting firms. Many of these firms, as you know, are growing in response to the demand for people trained to develop and analyze environmental impact statements, as per the requirements of the National Environmental Policy Act of 1969. Once again, the demand is clear for people broadly trained within the environmental field, people who understand the linkages and interdependencies among the economic, ecologic and socio-political systems. Our students are aptly trained for this work.

In closing on this topic, I would stress again, however, the non-vocational and liberal arts character of our curriculum, for it is in this area that our basic goals are to be achieved.

Finally, a word about our environmental conservation faculty. Disciplines represented in our faculty include forestry, geography, soil chemistry, wildlife ecology, recreation planning and agricultural economics. And, our efforts are well supplemented by our colleagues in such departments as English with course work on the nature writers; psychology, with course work in environmental psychology, and a host of others in the liberal arts fields.

Discussion of faculty leads me to the final and perhaps fundamentally most important point I would like to make today. I believe that much of the success of our effort at New Hampshire is due to an essentially non-academic but no less important circumstance. And that is that our institute faculty, numbering 30 at present, are located basically in the same building on two adjacent levels, with a smaller contingent right next door in an adjacent building. This means we see each other every day, almost without fail. It means we interact, we share our work, our daily thoughts, our common problems. It means, in the jargon of psychologists, that we empathize. We have in our institute, within our faculty and staff and within our 700 student majors, a constant sharing, a constant <u>cross-cultural ferment</u>, which leads to a positive self-image as one institute, one effort, and, conversely, to very poor soil for the growth of institutional barriers or faculty jealousies. We are one faculty, one institute, one effort. And, I believe that this one characteristic can make or break an integrated environmental effort over the long run. It is one of the most basic reasons (not the only but one of the most basic) why the Institute of Natural and Environmental Resources, University of New Hampshire, is a thriving, healthy organism today, and is likely to remain so for a long time to come.

THE RECYCLING OF A COLLEGE

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What is the process of recycling a college? Let us begin by setting the scene. Picture in your mind a 960 acre plot of land in the rolling Bluegrass Region of Central Kentucky near the foothills of the Knobs. About 150 years ago, the area was primarily covered by an oak-hickory climax forest; now it is surrounded by a chain link fence and minus about 850 acres of trees. There are four or five farm ponds and six man-made lakes. There is a modern seven building complex containing its own post office, for this 960 acre site is a town (complete with its own zip code) called Nazareth, Kentucky. Nazareth is located 35 miles southeast of Louisville. There are two major industries at Nazareth. One is a functional dairy operation which is the largest dairy farm in Nelson County, Kentucky. The other is King Center. King Center is an experiment to "recycle" the facilities that originally served as a private liberal arts college (Nazareth College of Kentucky). Nazareth, Kentucky, was founded in 1822 by three women who were initiating a religious order, the Sisters of Charity of Nazareth. Throughout the years, the Sisters created educational institutions at Nazareth developing from an elementary to a secondary school and eventually to a four-year college program. In August of 1972 the college closed and King Center was formed. King Center is an innovative idea for an educational complex that utilizes the former college facilities for educational and conference purposes. King Center has seven divisions including a Montessori program, summer camps, religious education programs, human resource development programs, retreats and conference programs. I will focus today on the environmental education program. Through the environmental program, King Center serves as a resident facility for school groups and other educational organizations concerned with environmental studies. It also functions as a center for teacher training.

The elementary and secondary school program in environmental studies functions year-round and involves students of all levels (Kindergarten-12) in both single and multi-day visits. Programs are developed individually by teachers and the King Center professional staff prior to the class visit. The King Center staff orients teachers to the facilities and study sites and provides suggested activities and schedules. During the subsequent class visit, the teacher is in charge of all activities.

In addition to the school groups, various young people's organizations such as Girl Scouts, Boy Scouts and ecology clubs utilize the environmental program at King Center. Adult groups have also participated in the Center's environmental program. Teacher training workshops are held periodically and the King Center staff is available for in-service training. The Center is also involved in cooperative programs with nearby universities.

King Center is one of several resident environmental centers in Kentucky. It has been endorsed by the State Department of Education but is not financially supported by the state. The environmental program at King Center offers a unique combination of urban and rural facilities that allow both the examination of basic ecological principles and their modern-day applications. With this familiar type of setting it is likely that the insights and learning taking

place during the King Center experience will be transferred back to the student's every day living situation in city, suburb, or small rural community. The 1,000 acre facility contains wooded areas, ponds, lakes, streams, fields and cultivated land. Every typical Central Kentucky environment is available for investigation. A self-guided ecology hike has been set up to point out various relationships in nature and their interactions with man.

Development of the environmental program consisted first in looking at the facilities, i.e., Nazareth, Kentucky, not as a place but as an environmental education resource. Let me describe how we have utilized the existing facilities as a vehicle for environmental education.

The college dormitories and dining facilities now serve to support the resident environmental groups; classrooms and lounges now serve as meeting areas. The former college library houses numerous books and publications including the environmental resource materials. The library resource center contains current environmental information as well as sample materials for curriculum and program development. In a field as broad as that of environmental studies, the need to know where to go for information is essential. Students have ready access to a library activity that familiarizes them with various reference sources. Several community organizations have contributed funds for library acquisitions.

The dairy farm is a popular spot for both urban and rural students. They visit the dairy and view the mechanical milking process through glass windows. Many of them help bottle-feed the calves.

Environmental education is not all out-of-doors. The fully equipped three-story science building is available for the coordination of outdoor and indoor activities. A bacteriology lab is utilized for testing water and soil samples. In the general biology lab the microscopic world can be examined to show that all life regardless of its size is interconnected. During teacher workshops the variety of laboratories and classrooms provide an opportunity for examining indoor applications of environmental education concepts. A darkroom is also available in the science hall for photographic work.

The historical remnants on the King Center grounds lend themselves to a consideration of the change in lifestyles over the past 100 years. Buildings have construction dates that span from 1850 to 1969.

Students discover that building materials, architecture and utilization of space has changed greatly through the years. A museum in the library contains numerous artifacts relating to man's use of natural materials in a variety of cultures. The cemetery at Nazareth dates back to 1807. It provides a source for studying population changes, the weathering of stone, and various cultural practices. A self-guided historical hike has been set up to teach the history of the area from an environmental perspective. During the travel to and from King Center, students can observe a variety of social trends, lifestyles and examples of the transition from urban to rural environments.

King Center provides a unique closed system for water investigations. The six lakes on the site provide the water supply for Nazareth, Kentucky. A student can trace water flow as it is diverted through the human community from its natural path in the lakes and streams. The water treatment plant and wastewater treatment facility provide opportunities to examine some means of dealing with pollution problems in areas of concentrated human populations. Utilizing these miniature systems, students are better able to grasp the situation in their own community, regardless of size. The variety of ponds, lakes and streams offer a wide spectrum

of water study areas.

What we have done is simply changed perspective in regards to the facilities available to us. It seems to me that changing perspectives is an initial step toward changing attitudes. This makes not only the end result of the King Center experiment, but also makes the entire process extremely significant. It is certainly a process that is transferable to small educational institutions throughout the country.

THE COLLABORATION OF LOCAL PUBLIC AGENCIES, INDUSTRY AND DELGADO JUNIOR COLLEGE FOR ENVIRONMENTAL EDUCATION

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Introduction

Environmentalists recognize the need and the importance of environmental education in our society. Many people associate environmental education with educating our educators in the various environmental fields; i.e., environmental education for elementary and secondary teachers.

There is another sector of our community that is in great need of environmental training that differs greatly from our teaching professionals. These people may be considered to be in community service occupations that are pertinent to community life and the community environment. These people provide many community services and usually go unrecognized, unrewarded, and unappreciated. Some examples of these community service occupations are mosquito and rat abatement personnel, pest control operators, water purification plant operators, wastewater plant operators, solid waste personnel (garbage men), pesticide spraymen, food handlers, etc.

Usually, funds for environmental education in these occupations are limited. Most local agencies assign higher priorities to such budget items as salaries, equipment, supplies, etc.

In many cases, there are no local training programs available for these occupations. These agencies assume these men know their jobs or can easily pick up these skills with on-the-job training after a period of time.

In today's session, I plan to discuss Delgado's role in the environmental education field with respect to local private agencies and industry. I will also expand my discussions to cover three particular environmental training grants in which Delgado's Environmental Health Department participated during the last year.

Delgado's Environmental Program

Delgado's program was implemented by a National Institute of Health grant in 1973. Over a two-year period, the initial grant has developed into a very broad program. We currently have the Associate of Science degree program, a continuing education program and a special grants program. In the associate of science degree program, we have two degrees available: Associate of Science in Environmental Health Technology and Associate of Science in Water and Wastewater Technology. The Environmental Health Technician Program prepares an individual to work as a sanitarian's assistant, environmental engineer's assistant or an assistant to any of the other environmental professionals. The Water and Wastewater programs prepare people to work as water and wastewater plant operators, laboratory technicians, and engineering aids.

Our continuing education program is designed to help community service personnel or the general public upgrade their education or learn new skills by attending special courses at night. Many community service personnel attend these courses on a regular basis.

Delgado's special grants program has found much success in meeting the needs of environmental education for the community service occupations as well as providing beneficial assistance to the college and the Environmental Health Department. Primarily, grant funds have been sought from federal, state and community agencies. As for community-supported grants, the Louisiana Mosquito Control Association and the New Orleans Pest Control Operators Association have been grantors for two years. We have contracted with them to develop and teach courses in Urban Pests Management. Agencies have found that environmental training in these community service occupations is necessary and proves economically beneficial to the companies and agencies over a long period of time.

The federal grants that we have been involved in come from the Department of Labor through the Environmental Protection Agency. Grants amounting to approximately $30,000 were from the Manpower Development Training Act (MDTA) as follows:

1. Safe Use of Pesticides Training Course
   Emphasis was on safety -- safety of the applicator or sprayman, environment, and the consumer from various types of pesticides. Ninety-seven men from various public agencies that spray pesticide were trained 160 hours, 32 hours of which consisted of classroom teaching and 128 hours on-the-job experience.

2. Solid Waste Operations Course
   Designed to provide occupational training to the solid waste industry personnel. This program was to provide solid waste personnel in local agencies and private industry with "in-class" and "on-the-job" occupational training in such areas as solid waste collection techniques, solid waste disposal methods, solid waste equipment handling and maintenance, safety and sanitary landfill design, maintenance, etc.

3. Water and Wastewater Plant Operators' Course

   The course was designed to meet the immediate needs of the student by teaching terminology of the occupations and providing basic entry-level operator's training. The program provided municipal, parish and federal personnel occupational training in areas of water sampling, testing, and methods of water treatment. The wastewater operators received training in the operation of primary, secondary and oxidation lagoon methods of treating wastewater. All personnel received instruction in plant equipment handling, general plant housekeeping, personal safety and report completion and writing.

All three grants involved environmental training necessary to have a clean and healthy environment. In most cases, the trainees are the "unsung heroes" of our communities.

Grants: Similar Characteristics

Although these grants were different in nature and type of training, there were certain program characteristics that we found to be similar, for example:

1. The educational levels of personnel in these training courses ranged from first grade through a college education. Most of

the men had minimal formal training, if any, in their respective occupations. Therefore, we were faced with the problems of designing a course to train some men who could not read and/or write and others who had college degrees in the same training sessions.

2. Local agencies, as well as the men themselves, needed some persuasion to participate in the training programs. Many men were not eager to return to a classroom situation because of the time since they were last in school. Many men were too tired to go to class after putting in a hard day's work. (How would you feel about going to class for four hours at night after eight hours on or behind a garbage truck?)

3. Many of the local agencies were concerned about such things as when and where training would take place, how much this training would cost them, how long and when it would be done, during or after working hours. As you can see, it takes some convincing, and, after many meetings with city mayors, parish councilmen and local agency representatives, we were able to convince them that it would benefit them in the long run.

4. Training in the environmental fields is not only needed from the actual training standpoint, but from the fact that new laws are being implemented constantly, placing new and unfamiliar requirements on local governments and industry. For example: (a) pesticide laws are being implemented on a continuous basis as research is done with new pesticides; (b) water quality standards are being established and instituted continually to meet new changes in water quality research. Of course, these training programs would, hopefully, make the agencies and industry aware of new technological advancements in their individual occupations.

Grants Differences

The EPA programs were of varied lengths according to their nature and occupational needs. Course lengths varied from eight hours during the day per week for four weeks in the pesticide program to eight hours at night per week for twelve weeks in the water and wastewater program.

Course instruction for the pesticide and the water and wastewater grants was provided by the experienced professional staff of Delgado's Environmental Health Department. The instruction for the solid waste course was handled quite differently. In addition to the departmental staff, other experts in the solid waste management field, including engineers, representatives from various equipment firms, contractors from the private sector, local businessmen and city and parish sanitation officials were added to provide an effective training program in solid waste management.

Almost all of our grant trainees were from local parish and city agencies with the exception of a few from private industry. The majority of these men were considered new entry trainees (less than one year on the present job) with some management employees in their jobs longer than one year. Many operators had no formal classroom instruction to perform operational decisions and laboratory analysis. In all, 160 men received initial environmental training or upgraded training in their respective community service occupations.

Changing Roles

At this time in the session, I would like to switch our roles; i.e., imagine yourself as the average citizen and not as an environmental educator. How is this Community Service Occupational Environmental Education helping us as average citizens? Assuming these trainees put their education to best possible use, we can possibly look for the following:

1. These trainees will be able to provide a better service for the citizens in the community. Hopefully, we can look forward to the spraying of pesticides more efficiently and safely, adequate treatment of water so that we can eliminate pollution of nearby water systems, and, by more efficient collection of garbage, the servicemen will be able to provide a cleaner city environment.

2. We cannot forget certain economic gains to be achieved by these training sessions. The efficient job performances should be reflected in the reduced cost of the services, ultimately saving some dollars to the consumer.

3. Of course, over a longer period of time, the environmental education to our community service personnel should provide a healthier environment, healthier people and possibly, fewer medical costs due to elimination of pests in and around the home, prevention of unsanitary dumping, acquisition of better drinking water, elimination of closed swimming areas (Lake Pontchartrain in New Orleans is closed at certain times of the year) and an overall awareness of many other environmental problems in the community.

Now that we have summarized some of the benefits that we, as citizens, should be getting from environmental education, are you, as a citizen, getting all of these benefits? The answer is, of course, NO. Why not?

Not enough local agencies are taking advantage of training programs although there are many environmental programs available. All that one has to do is to contact regional environmental education and protection agencies for possible sources of funds for these and other community type programs. In many cases, local and parish agencies are not even aware of the availability of these programs and/or existence of currently on-going environmental training programs. If they are aware of the availability, then usually grants are too much of a problem from the "bureaucratic red tape" standpoint and grant application paper work for these agencies.

We believe local governmental agencies and educational institutions must work very closely in coordinating environmental training in the community service areas or any other areas as a matter of fact. There is a definite need for more educational institutions to take advantage of the grants and start environmental programs for the unrecognized community service professional that provide vital services to our community life. The sooner we, as environmental educators, realize that another sector of environmental training is necessary, the sooner we may reap a few of the benefits that can be attained through these programs.

INTERDISCIPLINARY ENVIRONMENTAL EDUCATION IN THE SMALL LIBERAL ARTS COLLEGE

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I had contemplated beginning by stressing the need for environmental education, citing the increase in man's numbers coupled with use and misuse of non-renewable resources and environmental degredation. Instead, I would like to stress the need for and the role of interdisciplinary environmental education in the liberal arts college and present some of my experiences in directing such a program at St. Lawrence University.

St. Lawrence is a small (2,200 students), private liberal arts college in northern New York. It spreads over 1,000 acres with the Adirondack Mountains to the east and the St. Lawrence River and Canada only 18 miles to the north. It is a co-educational liberal arts college in a beautiful rural setting.

As a preface to these remarks, it may be worthwhile to look at the function of a liberal arts college, as the purpose of an environmental education program in such an institution will surely differ from an environmental program at a forestry college, an engineering college, or other skills-oriented programs. The liberal arts colleges are under the gun from many fronts today. A recent book by C. Bird, Case Against College, is indeed an attack on the liberal arts institution. It is my premise that it is not the liberal arts institution but the way these institutions are running liberal arts programs that is the major problem today.

The aims and objectives of St. Lawrence are probably not much different than those of many liberal arts schools. It attempts to help students develop an inquiring mind, enthusiasm to develop healthy and sophisticated questioning, to encourage tolerance and respect for different opinions, to nurture students' esthetic sensitivities. In short, the liberal arts education is supposed to provide the breadth, depth and integration in learning in order to train young adults to become thoughtful, critical components of our society. However, I submit to you that the majority of liberal arts colleges are most concerned with depth. I propose that undergraduate institutions cannot hope to turn out mini-experts; this is more appropriate for graduate education. There are some liberal arts programs concerned with breadth, i.e., distribution requirements, etc., but few are actively seeking integration. Indeed, a departmental structure where problems are looked at as biological problems, chemical problems, or sociological problems, is a contradiction to the whole concept of integration. The departmental structure certainly helps our administrative efforts, but it most certainly does not provide the student with integration; and the real world, the world in which we ask our liberal arts graduates to contribute, most unfortunately does not conform to the departments of institutions of higher learning.

It is this realization concerning interdisciplinary education and interest in the environment that first brought me to interdisciplinary environmental education with all of its benefits and associated costs. Instead of spending the majority of my remaining time on the benefits of interdisciplinary education, let me recommend to you a book entitled Environmental Responsibility in Higher Education: Processes and Practices, edited by Walter Hirscher and Robert Cook.

This book is a record of a national conference on Environmental Studies Programs in higher education that I was most fortunate to attend at the University of Wisconsin, Green Bay, in December 1972. The dedicated people at this conference laid out very clearly the benefits, costs, problems, etc., in interdisciplinary education, and I recommend it highly.

Once one is committed to interdisciplinary education and to interdisciplinary environmental education, there are many pathways available. They depend on the size of the institution, funds available, goals and objectives of your program, etc. I would like to tell you about my experiences as Director of Environmental Studies at St. Lawrence, the program at St. Lawrence, its attributes, and some of its problems.

I believe the initial precepts that we at St. Lawrence began with are applicable for any program.

1. Our program is environmental studies, not environmental science. It is therefore, by its title, a broad-based interdisciplinary program that includes the humanities and social sciences in a key role along with the natural and physical sciences. Environmental problems cannot be discussed as total problems if one excludes economics, politics, government, sociology, etc., or if one relegates them to second-class status within a basically science-oriented curriculum.

2. Our second premise is that environmental studies must relate to the environment of the institution internally and surrounding community. You should utilize the natural setting you find yourself in. At St. Lawrence we are extremely lucky in this regard. We find outselves between the Adirondack Mountains to our east and south and the St. Lawrence River and neighboring Canada to the north. We use these natural resources as our laboratory.

3. The third premise of our program is that where possible, problems should be real problems; we should not recreate the weaknesses of academicizing problems that exist in many departments in a program such as environmental studies. We, therefore, try to provide students with experiences in the community, with governmental agencies, etc., that maximize this potential. I will speak to this in a little more detail shortly.

4. And fourth, we decided, because of our size, financial situation and philosophy, that we would not form a department of environmental studies. First, it might be interesting to consider whom this department would hire. It would either hire specialists from many disciplines who are interested in the environment whom we happen to have on our campus already, or renaissance men who are knowledgeable about the entire problem. If such a renaissance man exists, I truly doubt St. Lawrence would be able to afford his salary, and I am fully convinced he would only be a renaissance man for a very short period. No one individual, not even a specialist, can keep up with the fast moving pace of the problems, literature, etc., in this rapidly changing day and age.

I will now speak to each of these areas in a little more detail. The interdisciplinary nature of our program is set right at the beginning. We have a

large introductory course that spans two semesters. The first semester deals with the problems we now face by discussing the evolution of the earth. We start with pre-life earth, talk about the biology, geology, chemistry of the evolving earth and then put man upon the earth and talk about his culture, society, the demographic changes of man, etc. This sets the stage for the problems themselves. Before we even discuss the problems, we talk about the social setting of the solutions to the problems, environmental economics and environmental law. We then deal with environmental degradation itself, looking at land use, pesticides, solid waste, air pollution, water pollution, etc., and lastly, we study energy as a case study of an interdisciplinary problem. Along the way, lectures are given in such diverse areas as the affect of religion on environment, environmental music, environmental ethics and environmental psychology. This course is coordinated by me and during the year includes representatives from 11 university departments. We have been fairly successful in this course, even though it has been very large by St. Lawrence standards, primarily because it is coordinated. Things just do not happen by themselves. I am present at every lecture and form links and bridges to each of the topics being presented. The faculty who present information are aware of what precedes their talks and what will follow their talks. Nothing fails quite as badly as "team-taught" courses where there is no coordination or where each faculty participant uses the course as a forum to "do his own thing".

How does one teach many speciality courses with limited financial resources without creating a new department? We at St. Lawrence have looked at the model of the University of California Program at Santa Barbara, directed by Dr. Roderick Nash, and adapted it to our circumstances. We are buying faculty on a rotating basis to teach our upper-level courses. In essence, the program works like this: We pay out of the environmental studies budget enough for a department to buy a new post-doctoral teaching fellow. For this we take two-thirds of a teacher's load from that department. For example, next year we have purchased two-thirds of an economist who will offer courses in resource economics and participate in an interdisciplinary environmental seminar, and the economics department will hire a new full-time teaching post-doctoral fellow to pick up the commitments of the man assigned to environmental studies. They also receive more teaching ability than they are losing, so it is not only advantageous to the environmental studies program, but also the economics department and its majors who now may get a new course that no one was able to teach before. It is also attractive to the university in providing new faculty without obligations of tenure, etc., to the program. This is very important, for next year we will have an economist and geologist, but the year after that we may very well have a sociologist and a chemist. By rotating these departments over a three or four-year period, the number of offerings in our program can be large; we can be a very dynamic program with stability and yet not build, at any time, an unwieldy, inflexible, and expensive department. At this time I am the only full-time person in the Environmental Studies Program, and plans for the future would not expand this by more than one additional person, if at all.

I have stressed student involvement with real problems and to accomplish this at St. Lawrence we supervise internships with community and governmental organizations. Students get academic credit for working with these organizations, and this has been a very successful component in our program. There are potential problems in this, however. Students should be prepared to deal with the agencies they seek out and their work must be organized and supervised by someone in this agency. I personally believe it is the faculty member's responsibility to establish expectations with the student, but it is responsibility of the representative of the agency or community group to guide student endeavors to meet their needs.

Although we are not a research-oriented school, we endeavor to provide research opportunities that will benefit our students and be helpful to the community. Even though it is only the first full year of our program, we have already established ourselves as a resource in the area for natural resource inventories to local municipalities and as a consultant for water quality studies. We are purchasing a mobile environmental laboratory especially designed to facilitate this integration with local environmental problems.

The last aspect of our program is an environmental impact analysis seminar. This seminar will use three faculty members - two purchased from other departments, and myself - to form, along with 15 students, an interdisciplinary environmental impact team who will analyze real problems in the community and try in one semester to come up with the most definitive impact statement possible within these time constraints. Again, we will use our local surroundings as our laboratory; i.e., we are now seriously considering a base study of the impact of the 1980 Olympic Games in Lake Placid, New York, as our first project. This senior seminar will provide the integration so important to a successful program.

Our program has grown substantially in another way. As interest in the program spreads, many people offering courses within their department are offering new environmental courses to meet increasing student interest, and we are looking at extending a system of dual numbered courses so that students may, for example, take a course in environmental law and politics either under a government number or the same course under an environmental studies number to meet their needs.

I would like to be able to end this presentation by telling you we have the perfect experience at St. Lawrence, but it is by no means so. For example, we do not have an environmental studies major as yet. Financial implications far beyond the period of our grant leave a serious question. We still have a conservative element of the faculty who feel interdisciplinary education, while an interesting side journey in a student's main objective in a liberal arts college, is not worthy of a full major. They charge we will turn out generalists with no skills, with no "areas of expertise" and therefore students should have a major in some "hard field". Although I do not share this view, we plan to submit a coordinate major (or dual major) program as well as a straight environmental studies major. As of now, students can use environmental studies in what St. Lawrence calls a multifield major which enables the student to develop his own major, but we have nothing beyond that. I personally and philosophically disagree with some of the critics, but that would take us into an entire new presentation of educational philosophy.

I have attempted to show you where I believe interdisciplinary education fits into a liberal arts college education, why it is needed in our society, and what St. Lawrence has attempted to do in meeting the weaknesses of liberal arts education in an interdisciplinary environmental program. I have elaborated on some of the actual methodologies we have used. We are by no means a perfect model that should be emulated, but I hope I have provided some ideas that you might be able to adopt at your own institutions.

In closing, I would like to caution against many new programs popping up all over the country. There are "new environmental programs" that are in reality all the same courses that have always been taught at the university, renumbered and given fancy names. There are programs in name only and with no direction. We are all familiar with the unemployed aerospace engineer who changes hats and is suddenly

an environmental engineer. Well, the same thing is happening to college curricula. Perhaps this antedote will illustrate this point.

A man goes to his physician for a checkup which has been long overdue. Tests are completed, X-rays taken - the works. The physician, after examining the man tells him he has very sad news -- the man is critically ill and only has six months to live. Had he taken care of himself, had he come sooner, he might have been able to forestall this disease, but the disease has progressed to such a state where indeed the end looks inevitable. The man, quite shaken, asks the doctor if there are any alternatives. The doctor replies, "Well, if you change your lifestyle, clean up your way of living, revise yourself, cut down all habits you have developed that are damaging and go at this revitalization with extraordinary determination, there might be some hope in the future. Extensive surgery will also be needed. It will be very expensive, but then there may be some hope". The man replies, "But the surgery will be expensive and I don't have the money. I have some very important things coming up in my job and other very important priorities. Isn't there an easier way or another way?". The doctor replied, "Well, for $15.00 we can touch up the X-rays".

I sincerely hope the reforms in education and indeed the reforms in our environment will be real and honest attempts at change and not just something to touch up the X-rays.

REGIONAL APPROACHES TO ENVIRONMENTAL EDUCATION: THE GREAT LAKES AS A MODEL

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Many environmental problems have regional implications that go beyond political boundaries. Until a sufficient number of citizens are informed of these problems and motivated to solve them, progress toward a quality environment will be slow indeed.

Regional approaches to environmental education have a realistic quality essential to creating a knowledgeable citizenry motivated to solve environmental problems. The 1972 amendments to the Federal Water Quality Act, for example, call for regional approaches to environmental management. Furthermore, the amendments specify numerous opportunities for citizen participation. If citizens do not learn of these opportunities, and do not exercise their rights, the quest for water quality can succumb to the historic problem of our society -- citizen apathy.

The definition of a region certainly varies according to the environmental management strategy under consideration. For water quality problems, a watershed concept is an appropriate basis for a regional approach. In other cases, different scales may be appropriate. Smaller areas, such as the southern half of Lake Michigan, or larger areas, such as the entire North American continent, could serve as the basic region.

For years, my husband and I have been interested in informing people about the resources and environmental problems of the Great Lakes and Lake Michigan in particular. In our work with students in the Chicago area, the neglect of Lake Michigan in environmental programs was glaringly obvious. There were no systematic attempts to study the lake from a number of perspectives. Aside from an occasional lesson by an excited teacher, Lake Michigan and the Great Lakes were ignored.

Instead, students studied small lakes in outlying areas without ever relating their studies to Lake Michigan or the Great Lakes.

Certainly, if children take time to go to local ponds to study local resources, some time should be devoted to analyzing related local, regional, national, and international resources and their problems.

By starting with local environmental management problems, a concrete, tangible experiential base is built from which appropriate generalizations to the broader environment can be developed.

In some ways, problems encountered in small lakes are identical to those encountered in large bodies of water such as the Great Lakes. For example, the buildup of selected pollutants in food chains such as DDT is a relatively universal concept. Such pollutants have similar effects on aquatic life, recreation and aesthetics in lakes of any size. Basic similarities exist in all aquatic food chains that begin with plankton and go through small fish to large predators.

Similar uses are often made of lakes of any size. They serve as the focus of

recreational activities, including swimming, boating, fishing, and aesthetic enjoyment and as sources of water for drinking, municipal, and industrial usage.

But, aside from basic similarities, many differences exist between the Great Lakes and small bodies of water in the region which might be studied first hand. The most striking difference is size. Other differences arise from it.

A larger percentage of the area of small lakes is potentially productive due to the greater amount of sunlight reaching their depths. The shores of the Great Lakes are almost entirely without bottom organisms due to pounding wave action, while the edges of smaller lakes are often the zones of highest population density.

In studying small bodies of water and comparing them to larger ones, two possible errors can arise. The first is that students will fail to draw analogies between the local situation and the broader region, and the second is that they will draw inappropriate analogies. Students must be deliberately guided in recognizing differences and similarities in ecological units of various sizes and they must be helped to draw appropriate analogies.

Recognition of the value of studying small bodies of water and relating these studies to environmental concerns of the Great Lakes led me to develop a course of study in water-quality problems in the Great Lakes region for in-service teachers.

My first assumption was that the major factor preventing study of the Great Lakes through local situations was a lack of adequate materials assembled in a form useable for teachers.

As I gathered materials, my assumption was verified. It took a great deal of time to gather, read, and digest all available materials, to sort through them to determine their relevancy and usefulness, and to assemble them into some sort of a coherent whole.

Sources of information included government documents, reports of scientific studies, conference proceedings, water resources texts, periodical articles, special projects reports, and interviews with experts.

Essential concepts were identified. Factual materials were organized into either ecological, economic, political, social, or technological concepts. These concepts were then organized into an outline for the course:

1. The effects of low water-quality standards

    a. on recreation and aesthetics
    b. on fish and wildlife
    c. on health and welfare

2. The effects of high water-quality standards

    a. on urbanization
    b. on agriculture
    c. on industry and shipping

Teachers in the course were taught by two different formats. One section met weekly to hear lectures, view films on related water resources problems,

experiment with water quality testing and read assigned articles. The second section worked independently in contacting agencies and individuals for their own information. They went through essentially the same process as I had in my information gathering. A library of materials assembled during my research was available to them. Both groups developed lesson plans to use with their own classes.

The purpose of teaching with two formats was to determine whether either was more effective than the other in developing positive attitudes toward the Great Lakes. According to attitude theory, personal involvement (in this situation, data gathering and interviewing on one's own) results in heightened commitment and more positive attitudes. However, in this case, practicality took precedence over theory. Tests revealed that teachers in the lecture group developed more positive attitudes than those in the individual study section.

Apparently, some teachers in the independent group resented the extra work of contacting agency people and would have preferred the convenience of the lecture format. In subsequent courses teachers have not been divided into lecture and independent study groups. Both methods have been combined, and teachers have found ways to contact agency personnel despite their tight time schedules.

As a result of these experiences, we found that by studying local aspects of regional concerns, such as water supply, human impacts on water quality, and the impact of water quality on fish and wildlife, regional analogies can be drawn and easily understood. For example, wall-eyed pike exist in selected environments in the Fox Lake Chain of Lakes in northern Illinois. One teacher led her class in a study of this relatively small population. Once they had studied the ecology of the wall-eye with the small lakes, their learnings were easily transferable to specific habitats within the Great Lakes.

We are finding that investigating the Great Lakes region helps both teachers and students recognize the attributes which make it function as a unifed ecological system. Given the thrust of our federal legislation and the real need to deal with environmental problems on an appropriate ecological scale, regional approaches to environmental education have an important role to play in the development of environmentally literate and effective citizens.

AN IN-SERVICE TEACHER TRAINING MODEL FOR ENVIRONMENTAL EDUCATION

James Joseph Gallagher
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-and-
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Introduction

The State of Illinois, like many other states, has recently passed legislation mandating schools to incorporate environmental education into the school curriculum. A State Environmental Education Plan providing curriculum organization to the law was organized and is presently being made available to school districts throughout the state. Encouraged by the development of a suggested curriculum and a state law for environmental education, the College of Environmental and Applied Sciences of Governors State University initiated a one-year in-service teacher-training project. Supported jointly by the United States Office of Education and the Board of Governors of State Colleges and Universities of Illinois, the teacher training project was designed to develop environmental education leadership personnel for secondary school districts in the Greater Chicago region. Goals for the in-service training project were:

1. Improving knowledge of the causes, consequences and ways of solving environmental problems;

2. Increasing knowledge of and skill in using materials and strategies for environmental education; and

3. Enhancing knowledge and skills in leadership roles.

To realize these goals, an in-service teacher-training model for environmental education was developed. The Environmental Education Leadership Development Project involves a combination of university work and guided experience in participants' school districts.

On-Campus Workshops

Ten day-long workshops held monthly at the university comprised the first part of the Environmental Education Leadership Project. Figure 1 summarizes the objectives for the day-long workshops. A number of topics were organized for day-long workshops and were designed by the project staff with the aid of university specialists from a variety of subject areas. Examples of workshop topics include Air and Water Pollution, the Quality of Life, a Process Approach to Envir nmental Education and Instructional Materials. Topical areas were designed to engage participants in learning activities such as:

1. Laboratory and field work;

2. Participating in multi-disciplinary studies of environmental problems and issues;

IN-SERVICE MODEL FOR ENVIRONMENTAL EDUCATION
ENVIRONMENTAL EDUCATION LEADERSHIP DEVELOPMENT PROJECT

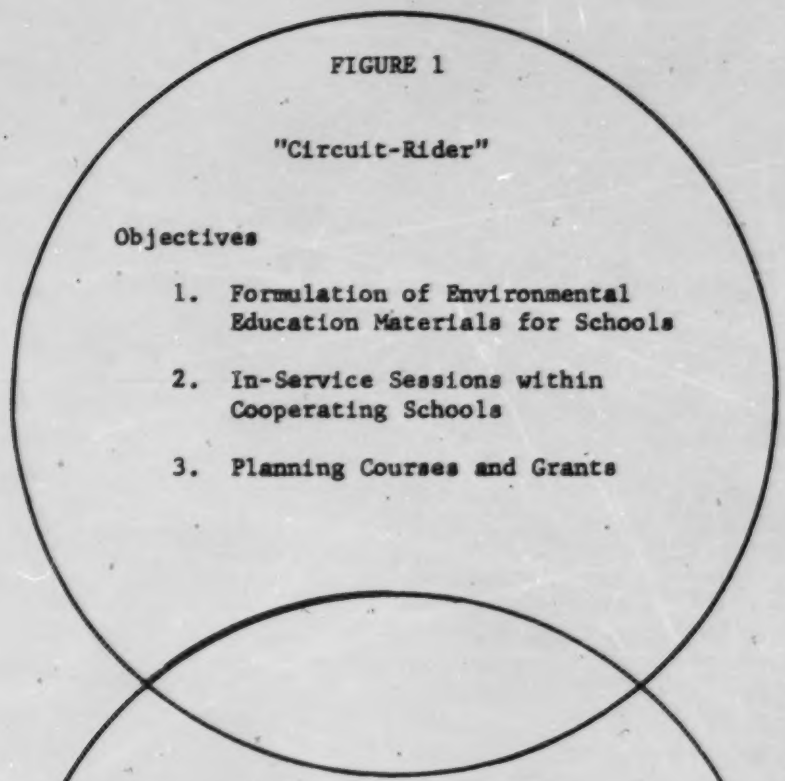
"Circuit-Rider"
Objectives
1. Formulation of Environmental Education Materials for Schools
2. In-Service Sessions within Cooperating Schools
3. Planning Courses and Grants

FIGURE 1

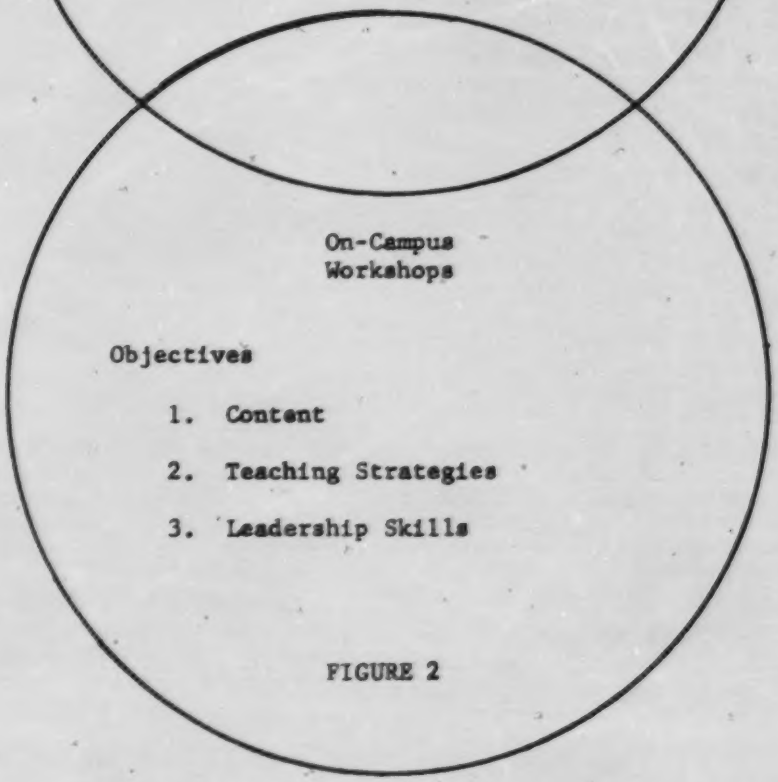

FIGURE 2

3. Considering legal, economic and ethical consequences of environmental problems and their solutions;

4. Analyzing instructional materials for environmental education; and

5. Learning leadership skills and their application in bringing about improvement in school curriculum.

All workshops were conducted on Monday or Tuesday from 2:30 to 10:30 p.m., as school districts were not able to provide substitutes to release teachers during the day. All have been high-intensity and activity-based. Feedback from the participants has been utilized in planning subsequent workshops. Perhaps the most significant appraisal of the workshops is provided by the continued high level of attendance of participants who come on their own time after having taught all day, stay until after 10:00 p.m., drive one and one-half hours (perhaps longer on some of our Illinois winter nights) to reach home, and tnen return to teach in their own school the next morning by 7:30 or 8:00 a.m.

Workshop Schedule

Some minor readjustments in the original organization of the ten university-based workshops occurred due to input from the participants and improved availability of resource persons. The revised schedule follows:

October 8	Introduction to Environmental Education Leadership Development Project; Scope of Environmental Education
October 29	Leadership Development; Basic Ecology
November 19	Human Ecology; Environmental Planning; Problem-Solving Skills
December 10	Environmental Education Instructional Resources; Simulations and Games
January 13	Environment, Behavior, and Values; A Process Approach to Environmental Education
February 4	Environmental and Social Effects of Natural Resource and Energy Utilization
February 25	Air and Water Pollution: Causes, Monitoring, Correction; School Site Development
March 25	Basic Ecology in Natural Study Areas; School Site Development for Environmental Education
April 15	Environment, Behavior, and Quality of Life; Lifestyles on Our Spaceship Earth
May 6	Improving Environmental Quality; Agencies and Laws of Environmental Improvement

Guided Experiences in Participants' School Districts

The second part of this training model involved guided experiences within

participating districts. This work was planned separately for each district by each team of participants, their school officials and the "environmental curriculum circuit rider". During the year the "circuit rider" and participants met at least once each month in eacn home district to plan and implement activities such as (Figure 2):

1. Formulating interdisciplinary lessons, units and curriculum for environmental education;

2. Developing plans for utilizing the school site and the community as resources for environmental education;

3. Developing district-wide in-service programs for environmental education;

4. Evaluating project activities and objectives; and

5. Implementing strategies for improving environmental education in their own district.

School-Based Activities

The Environmental Education Curriculum Circuit Rider has had both a high level of involvement and excellent success in each of the sixteen cooperating districts. Participants, administrators and other teachers worked with the Circuit Rider on a regular basis. Some examples of the range of activities that have occurred are:

- Planning a K-12 curriculum for Environmental Education

- Developing special high school courses for Environmental Education

- Developing a school site as a demonstration center for Environmental Education

- Planning and implementing an in-service program for teachers on Environmental Education

- Planning a multi-million dollar Human Services Park, including a secondary school and health care and welfare facilities, on an environmentally sound basis, in a central city area

These field-based meetings in the participants' schools provide an opportunity to apply the knowledge and skills acquired in university work and to raise questions about practical problems of implementation of curricular improvements.

Evaluation

Presently, a post-test experimental control group evaluation plan is being used to determine the effects of the in-service training model. Instruments evaluating the amount of content retained, value preferences, and a teaching attitude are being used to determine the effects of the project. These tests are being given to the participants and non-participants with similar backgrounds. Results from these tests will be available on June 30th. A booklet describing the procedures used in organizing, implementing, and evaluating the in-service training model will result from this project.

INSTRUCTIONAL MATERIALS

FOR

ENVIRONMENTAL EDUCATION

TEACHING ENVIRONMENTAL EDUCATION THROUGH THE USE OF AUTOTUTORIAL LEARNING PACKETS

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Using autotutorial learning packages can be an exciting and different approach to a program in environmental education - at any grade level. Having students develop their own packets to share with other students as well as become a part of library resources provides an even greater teaching-learning situation. This is what is being done in Humble and Galveston School Districts in Texas.

For clarification purposes, a description of a learning packet is needed. There is nothing magic or sacred about the guidelines submitted here, but it is helpful if the students follow the same general format. There is no one way to get from New York to Florida, but it is anticipated that everyone will eventually arrive in Florida. This is the same principle used as students developed learning packets. There were not required to do them all the same way. To begin with, the learning packets were written on any subject the student chose. A goal, objective, or purpose was required so that not only the writer but the user would know what he could expect to learn from the module. Second, the module needed a pretest with questions over the material to be presented, which would be only as long as necessary to cover the information taught in the packet. The next section of the packet concerned content. This consisted of information followed by activities. Information was given in small amounts and followed by some activity which would "fix" the learning. This section was followed by a post-test. All answers to the pretest and activities were included in the module so that students working through a module could have immediate feedback. Leaving the post-test answers in the packet was optional.

Look again now at the component parts of the learning packet:

1. Objectives
2. Pretest
3. Pretest Answers
4. Information
5. Activities which will provide the student an opportunity to internalize the information
6. Post-test
7. Post-test answers - these may be kept in the modules or in some place easily accessible

With this common understanding of the form for autotutorial learning packets, it is possible to discuss the process used in getting students and teachers interested and involved.

The first step was to help teachers become aware of the need for teaching students that man needs the environment more than the environment needs man; and additionally, that one should have a genuine concern for the future. This was done through in-service sessions and informal visits with the teachers and principals. Where teachers were already interested in and concerned about environmental problems, the in-service session was not necessary. Once the teachers were interested, they were able to get the students interested! However, most of the teachers involved in the project did need instructions in how to write a learning packet. After this, the teachers worked with students in developing learning packets concerning problems related to the environment. One group of second graders had difficulty in understanding what pretest and post-test were, but they understood what a before-test and an after-test were and were allowed to use those terms.

Students from kindergarten through twelfth grade were involved in the development of modules. Those developed at the kindergarten level were extremely simplified and were prepared on fan-like cards, so that children could use them to explain environmental concepts. Students in first and second grades developed their modules through experience charts under the leadership and guidance of the teachers. After the development of the experience charts, students capable of printing legibly were given the responsibility of rewriting these while others drew pictures, collected items, or carried out other activities necessary for the completion of the learning packets.

Students in grades three through twelve developed modules with very little assistance from the teachers. Librarians reported that for the first time they had to "make" students leave the library. Most students in the elementary school were not satisfied to make only one module. Once turned on, they were filled with ideas.

Modules, or learning packets, ranged from very simple to very elaborate. Two seniors prepared an elaborate packet concerning over-population, using an animated film, slide-tape presentation, a game which they devised, and other activities.

The excitement of seeing students work together was worth the effort expended in getting the project started. Some students prepared individual projects, while others worked in groups of two or more. Some drew visuals, some made slide presentations, and some cut pictures. Each module was unique.

The valuable part of this project was not the learning packets per se, but the process involved and the learning which took place during the process of developing the packets. In effect, the recognized end product was not the end product. However, the learning packets which were validated by students and passed the test of student evaluation have been incorporated into the curriculum of the districts and will be used by other students in future years. This is a beautiful learning activity as well as an exciting way to have students write their own curriculum at their own developmental level.

THE COUNTY RESOURCE MANUAL: A MODEL FOR INCREASING TEACHER USE OF RESOURCES AVAILABLE BEYOND THE CLASSROOM

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and
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The community and region surrounding every school contain a rich supply of opportunities for students to learn - to learn from life in a setting particularly relevant to them. The community and its surroundings carry significant meaning when they provide examples of the things considered in the classroom.

School is typically posed as "learning for living". One may pause to consider this and note the inconsistency of the efforts of some schools with this goal. How much more consistent schools would be if educators drew upon their local areas for real life examples of the many things considered in the curriculum.

A manual for the use of out-of-class resources seeks to present the wealth of community and regional resources in an organized construct. It attempts to facilitate resource use by teachers at all grade levels and for instructional purposes consistent with the teacher's goals.

Historical precedent for the educational use of out-of-class resources is well documented. Most noteworthy of the early examples would be Renaissance Italy serving as a mecca for those who sought culture by participation. In the United States, a national trend toward school and community interaction could be noted in the 1940's and through the 1950's. Educational leadership began to relate the learner to his environment and the school to the community. National focus was accented by the supportive posture taken by numerous educational organizations. Entire issues of professional journals were devoted to the topic. Over half of the then 48 states provided leadership in the educational use of out-of-class resources with workshops and/or materials. Resource guides were developed in many communities across the country. The nature and sophistication of each was dependent on the goals of the particular sponsoring school or organization.

Today, the widespread use of community resources is not what it was earlier. The literature documents only a few models beyond those presented here. One effort regarding teacher use of area resources has been noted at Indiana University (Duvall and Truax, 1970). The community resources of South Bend, Indiana, were listed and identified as to subject area with additional information and fed into a computer. Graduate students in social studies, many of whom are practicing teachers, were and continue to be involved in the task. A guide listing the resources and directions for resource information retrieval was given to all teachers of the South Bend, Indiana, schools. In addition, a Title III, ESEA, outdoor education project in the Parkway School District of St. Louis County, Missouri (1971), is using selected community resources for curriculum development purposes.

The County Resource Manual

Over the past twelve years the writers have been involved in three separate

projects designed to facilitate teacher use of area resources. In all cases, the geographic area employed was the political, county unit. The county region was utilized for no more than pragmatic reasons, each case differing somewhat from all others.

The three projects resulted in two types of resource reporting models. Type I consists of a prosaic description of categories of resources within the county unit. It is represented by the Natural Resources of Kankakee County [Illinois] (Hungerford & Shepherd, Eds., 1963).

The Kankakee, or Type I, model consists of a 65-page resource manual which describes nine separate categories of Kankakee County resources including water, soil, minerals, forests, and wildlife. Separate chapters deal with a succinct history of the region and a synthesis of the relatedness existing between and across resource categories.

The Type I model could be produced by any number of reputable agencies, but this particular Kankakee County endeavor was put together by an autonomous group of interested lay citizens and educators calling themselves the Kankakee County Conservation Committee. Separate sections of the manual were written by committee members and submitted to two editors who volunteered their services for this work. Line drawings and photographs were also incorporated.

The Type II model is perhaps favored by the writers, but it should be pointed out that the second differs markedly from the first. Type II products exist as annotated listings of resources available for use by teachers both within and without the county unit. They are simply a means to communicate the availability of a large number of resources to classroom teachers and describe the resource potential, limitations, and suggestions for using these resources. Two such models exist (Gardella, 1973; Hungerford, Ed., 1972).

In each of these products, resources are identified and categorized into a distinct and cross-referenced taxonomy of resources. Categories used include economic, governmental, historic, recreational, science/natural history, and human resources. Each entry is annotated by whoever surveys that particular resource. In addition, suggested grade level parameters are identified along with use limitations and the individual who would be contacted in the event the teacher desires to use the resource in question (an example syllabus entry can be found in Appendix IV).

No individual should attempt to prepare a Type II syllabus manuscript alone. The data collection necessary to produce a quality product is extremely time-consuming. In the two Type II manuals developed by the writers, nearly 300 separate resources are annotated. Because each annotation is the result of separate data collection procedures - either by questionnaire or personal interview - the time involved in the preparation of a manuscript is significant.

A number of strategies might be employed to provide enough manpower to complete a Type II county resource syllabus. The techniques employed in the two products in question were, in the first instance, the organization of an independent group of volunteers consisting of graduate students, teachers, and university professors. In the second instance, a formal in-service workshop was organized for the precise purpose of surveying resources and collecting the data needed to produce a syllabus.

Publishing and Distributing the Product

In two of the three projects with which the authors were associated, the

resource manuals were physically produced using the resources of the County Superintendent of Schools. One was duplicated by the traditional mimeograph method; the other was run on an offset press. In the third project, the manual was reproduced by a commercial printer. This work was paid for by funds acquired from the County Bankers' Association. In all instances, the covers and binding were attractive and the products equally usable.

Distribution of resource manuals to classroom teachers poses little problem in counties where the County Superintendent is sympathetic and county institutes are held. A small segment of a county institute could be devoted to the manual and distribution made at that time.

In one instance, distribution was coordinated by the Assistant County Superintendent who personally supervised the distribution of the product to area schools (Jackson County, Illinois).

With respect to the Kankakee (Type I) manual, members of the County Conservation Committee also distributed the product throughout the county to public libraries, hospital waiting rooms, barber shops, and doctors' offices. This mode of distribution for this type of manual proved extremely popular, and the use of the publication in these instances surpassed the expectations of the committee. Evidently, the public is interested in county resources if they are described in a pleasing and succinct manner.

The Monmouth County (Type II) manual was sold to support its duplication and distribution. It was further supported by the New Jersey Council for Environmental Education and distributed to all 21 counties of that state by this organization.

Educational Impact of Resource Manuals

Does the resource manual result in greater resource awareness on the part of the classroom teacher? Does the resource manual result in greater use of resources by teachers?

A research study related to the Monmouth County Model (Gardella, 1975) is currently underway. Preliminary evidence indicates that the answer to both those questions is "yes".

Whether development of an annotated guide to resources is made on a community or regional basis depends on the interest and manpower of the organization concerned. Evidence of past and present efforts indicates that the project is educationally sound and valuable. If community people are initially involved, evidence further suggests that it may well serve in bringing a community and its school closer together.

For additional information please contact either of the authors at:

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Presented at the Annual Convention of the National Association for Environmental Education, New Orleans, April 29, 1975.

APPENDIX I

A Sample Inventory Worksheet

Inventory Worksheet

Name of Resource_____

Appropriate Grade Levels: K-3___; 4-6___; 7-9___; 10-12___.

Categories: (Check the Major One) Science/Natural History (Sci./NH)_____;

Governmental (Govt.)____; Historical (Hist.)____; Economic (Econ.)____;

Recreational (Rec.)____; Human Resources (H.R.)_____.

++++++++++++++++++

DESCRIPTION OF THE RESOURCE (ANNOTATION):

_____

SUGGESTIONS FOR EDUCATIONAL USE:

_____

LIMITATIONS PLACED ON USE, e.g., hours, necessary preplanning, etc.

_____

PERSON IN CHARGE OF RESOURCE: Mr., Miss, Mrs., Dr._____

_____

MAILING ADDRESS: Street, RFD, Box No._____

City/Town and Zip_____

TELEPHONE:_____

_____

Which categories, if any, should this resource be cross-reference to?

_____ _____ _____ _____ _____ _____

COMMENTS:

APPENDIX II

Sample Syllabus Cover Pages

EDUCATIONAL RESOURCES

SYLLABUS OF AREA RESOURCES

FOR TEACHERS OF

JACKSON COUNTY, ILLINOIS

October, 1972

RESOURCES
IN
PERSPECTIVE

An Educational Guide to
Out-of-Class Resources of
Monmouth County, New Jersey

by

J. Ronald Gardella, et al.

November 1973

APPENDIX III

A Sample Table of Contents for the Resource Syllabus

TABLE OF CONTENTS

Section	Page No.
Title Page	
Map of Jackson County, Illinois	
Preface Statement	1
Acknowledgements	2
Appropriate Educational Guidelines for Teachers Using Environmental Resources	4
Economic Resources Cross-referenced to Other Resource Categories	6
Governmental Resources Cross-referenced to Other Resource Categories	8
Historical Resources Cross-referenced to Other Resource Categories	9
Recreational Resources Cross-referenced to Other Resource Categories	10
Science and Natural History Resources Cross-referenced to Other Resource Categories	11
Human Resources Cross-referenced to Other Resource Categories	13
Listing of Economic Resources	15
Listing of Governmental Resources	35
Listing of Historical Resources	45
Listing of Recreational Resources	52
Listing of Science and Natural History Resources	56
Listing of Human Resources	75
Additional Resources Annotated by the Teacher	87

APPENDIX IV

A Sample Syllabus Entry - Science and Natural History Category

RESOURCE: Crab Orchard National Wildlife Refuge

GRADE LEVELS: K-12

DESCRIPTION: Resources relative to nature interpretation and wildlife management programs are available through the interpretive specialist working with the U. S. Fish and Wildlife Service at Crab Orchard National Wildlife Refuge east of Carbondale. Other field experiences using historical and cultural resources of the area are also possible. The area abounds with wildlife at all times of the year and exhibits many types of ecological communities. The refuge is the fall and winter resting area for thousands of wild geese, mostly Canada geese. The area is open to all grade levels. It would appear productive to be used in conjunction with topics such as ecology, natural history, wildlife management, forestry, bird migration, and biogeography. Certain historical sites are also available for field trip experiences.

USE LIMITATIONS: Normal school hours; good preplanning with interpretive specialist highly recommended; arrangements must be made in advance.

PERSON IN CHARGE: Mr. William McCoy
Crab Orchard National Wildlife Refuge
Box J
Carterville, Illinois 62918

Telephone: 997-3344

Name of Resource: Wooley's Fish Market

Appropriate Grade Levels: K-3; 4-6. Other: Handicapped

Categories: Science/Natural History - Economic

Description of Resource

A. Location of Resource: Highway 9 - three miles south of Freehold.

B. Physical Description of Resource: Retail store. White, frame, one-story.

C. Facilities Available: Ample parking. Other facilities for emergency use only.

D. Tours/Activities Provided: A guided, explanatory tour.

E. Recommended Student Dress/Equipment: Optional.

F. Costs: None.

Suggestions for Educational Use

A. Aim/Purpose

1. To provide an awareness of the ways fish serve man.
2. To allow students of the third grade to see the fish close at hand.

B. Suggested Pre-Visit Activities:

1. Discuss the value of fish as food in the diet.
2. Have students list the kinds of fish they have eaten.
3. Find out how the fish is transported from the time the fish is caught.

C. Suggested Teaching Activities/Strategies:

1. List the names of all fish seen and note from what waters they had been taken.
2. Note the size, color and shape of the fish.
3. Have students consider the way some fish are prepared.

D. Suggested Post-Visit/Follow-Up Activities:

1. Compare ideas with actual discoveries.
2. Locate areas on a map where the fish lived.
3. If cooked fish was sampled, how did it compare with other foods?

Reference Information

A. Printed information, AV Materials Available: Movies - "Animals That Live in Water"; "Shellfish".

B. Resource People: Mr. Joseph Russo, Mgr., Wooley's Fish Market, Highway 9, Freehold, New Jersey 07728; Telephone: (201) 462-4962.

COMMUNITY EDUCATION IN LAND-USE DECISION MAKING: NEW INSTRUCTIONAL MATERIALS

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-and-
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In the face of population and technological expansion, government, and environmental leaders have become aware of the importance of cooperative land-use decision making by experts in many fields. As population expands, its impact upon the environment will be profound. Technological planning for this expansion is no longer a matter of choice; it has become a matter of urgent necessity. Environmental management technique to harmonize the physical environment and natural resources with social needs and limitations must be developed and implemented.

Most communities have started to move toward the development of environmentally sound land-use policies. In the process, there is often a need to expose members of the community to educational materials on the general concepts of land-use decision making. Based upon the expressed needs of several communities in the state, E-P Education Services, Inc., has sought for and received funds from the Office of Environmental Education in the Department of Health, Education and Welfare for the development of individualized instructional materials on land-use decision-making processes. These materials are designed for use by members of communities, community agencies and secondary schools. The completed materials will be distributed to all communities in the State of Connecticut who wish to receive and utilize them.

The development of the materials has proceeded in a unique manner. The decision makers in Connecticut's towns have been asked to share their experiences relating to the need for community education in the area of land-use decision making. Their responses have shaped the backbone of the program.

The instructional mode of the program is a mix of audio-tutorial (cassette tapes and 35mm slides) and simulation gaming intertwined with programmed materials, guide sheets, demonstrations, experiments, and field work. This innovative approach allows for individualized instruction in the classroom and also allows individual community members to study land-use planning in their homes, on their own time, at their own pace. The program has the potential for students and adults to study similar material with subsequent benefits of increased communications in the community.

In reaction to the demand for high impact instructional materials which foster the development of a positive attitude toward land-use planning and its cognitive component, the project has developed audio-tutorial and simulation gaming materials to deal with the topics outlined. The following section outlines the reason for selecting the audio-tutorial mode of instruction.

Research findings of the past decade indicate that if learning-teaching systems are to be effective they must:

1. clearly state the goals of instruction in behavioral terms so they may be evaluated (Mager);

2. structure the learning environment so that students are exposed to fundamental concepts that can be used in future learning and problem solving (Ausubel, Bruner, Gagne);

3. match effective education media with a specific learning event (Briggs);

4. facilitate the development of a proper attitude toward learning and make students increasingly responsible for their own intellectual development (Dixon);

5. provide for evaluation that keeps the learner informed of his progress and helps the teacher judge the adequacy of his teaching methods (Bloom, Cronbach); and

6. make allowance for aptitudinal, attitudinal, and personality variability among students (Cronbach, Haakonsen).

Audio-tutorial systems are designed with these parameters in mind. In an A-T system, careful attention is given to the statement of objectives, the selection of modes of instruction, and the kinds of learning involved in achieving stated objectives. Ideas are presented in an orderly sequence, and students are able to proceed at their own rate of speed. If the sequence is right, and the learner is informed about the goals of his learning, the motivation for learning will be built in.

The Land-Use Decision Making Kit contains 15 audio-tutorial units plus supplementary material. Listed below are the titles of each unit with a few key descriptive words to indicate the content of each unit:

(The number in parenthesis indicates the length of cassette tape devoted to the unit. Each cassette is one hour in length.)

1. INTRODUCTION (1)
   What is land-use planning?
   What is land-use decision making?
   Need for land-use planning
   Various philosophies of planning

2. PLANNING FOR PEOPLE (1)
   Basic Demography
   Using Demography in Planning
   Use of Census Data
   The Social Survey - Housing, Recreation, Development, Conservation
   Community Survey
   Knowing your Community

3A. OPEN SPACE (½)
   Value of open space
   Agricultural Land as open space
   Need for open space
   Functions of open space
   Urban open space

B. UPLANDS (½)
   Forest ecosystems
   Agricultural ecosystem
   Ridges
   Diversity
   Watershed

4A. INLAND WETLANDS I (½)
- Structure
- Function
- Soils
- Vegetation
- Classification

B. INLAND WETLAND II (½)
- History of
- Regulation
- Case Study

5A. COASTAL WETLANDS I (½)
- Structure
- Productivity
- Function
- Value
- Vegetation Sequence

B. COASTAL WETLANDS II (½)
- History of Destruction
- Law and Regulation
- Coastal Planning
- Coastal Zone Management

6A. MAPS-MAP READING (½)
- Use of Topographic Maps
- Map Types
- Map Interpretation
- Map Symbols
- Skill Unit

B. AERIAL PHOTOGRAPHY (½)
- Interpreting
- Value in Planning
- ERTS Photo's
- Use of Aerial Photographs in Planning
- Case Studies

7. GEOSYSTEMS (1)
- Soils
- Soil Types
- Topography
- Depth of Bedrock
- Surficial Geology
- Septic Systems
- Bearing Capacity
- Formation of Landscape
- Geology

8. HYDROSYSTEMS (1)
- Hydrology
- Water Movement
- Hydrologic Cycle
- Ground water
- Watershed
- Floodplains
- Flood Planning
- Aquifers
- Water systems and quality
- Water Pollution
- Septic systems
- Erosion and sedimentation

9A. CULTURAL SYSTEMS I (½)
- Land-Use Analysis
- Visual Analysis
- Visual Zones
- Aesthetics
- Land-Use Types
- Ownership characteristics
- Mapping land-use types

Regional Context

B. CULTURAL SYSTEMS II (½)
- Transportation analysis
- Transportation patterns
- Utility systems-location (water, gas, sewer lines, solid waste, and energy) needs

10. SYNTHESIS I (1)
- Buildability
- Septic tank suitability
- Ground water problems
- Erosion Susceptibility
- Vegetation and Wildlife
- Composite-

11. SYNTHESIS II (1)
- Attractiveness Concept
- Conservation and Recreation
- Housing
- Commercial-neighborhood
- Commercial-shopping centers
- Schools-Public Facilities
- Manufacturing-Industry
- Utilities
- Transportation
- Attractiveness Concept

12A. OPEN SPACE PRESERVATION (½)
- Zoning
- Clustering
- Taxation
- Fee purchase
- Easement
- Public purchase
- Gift

B. ECONOMIC POLICIES AND LAND-USE (½)
- Taxes
- Land value
- Assessment
- Cost-benefit analysis

13. LOCAL IMPLEMENTATION (1)

Zoning
Zoning Board
Zoning Board of Appeals
Planning Board
Types of Zoning
Zoning Maps
Zoning Ordinances
Cluster Zoning
P.U.D. Planned Unit Development
Floodplain Zoning
Property Taxes
Subdivision Control

14. STATE IMPLEMENTATION (1)

Regional Planning
Plan for Conservation and Development
State land-use planning
Energy siting
Resource recovery planning
Innovations in state land-use management
Tidal wetlands
Inland wetlands
Taxes
Flood control
Fiscal Planning
Preservation of Agricultural Land
Transportation
Outdoor Recreation
State Parks & Recreation

15. FEDERAL IMPLEMENTATION (1)

National Flood Insurance
Coastal Zone Management
Impact of Environmental Regulations on Land-Use
Land-Use Implications of Area-wide Waste Treatment Management
Flood Control
NEPA
Environmental Impact Statements
Clean Air Amendments
Energy Siting
Sewer Line Grants
Fiscal Planning
Transportation

Physically, the Land-Use Decision Making Kit contains:

15 - 1 hour cassette tapes
over 200 - 35mm color slides divided among the units
over 350 pages of guide sheets divided among the units
each unit will have a set of behavioral objectives, worksheets, glossary annotated bibliography
plus a series of government publications to supplement the audio-tutorial units
the kit will have a leader's manual with strategies for use, other activities, suggestions for field work, etc.

The presentation at the New Orleans meeting of the NAEE consisted of an overview of the project design and implementation. Participants were involved in the use of the tapes, guide sheets, slides, maps and basic activity format of selected units.

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THE ENVIRONMENTAL CURIOSITY SAMPLER AS A MODEL

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Open Lands Project
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The Environmental Curiosity Sampler is a book on environmental study areas in the six counties in northeastern Illinois. It is a book to help develop environmental awareness for teachers, youth group leaders, parents, and other curious individuals.

It was written following many requests for information on specific local places to study various environmental concepts. Information which was available was isolated and uncoordinated. People also wanted suggestions for ways to use such study areas.

The Open Lands Project, a private organization which has a working relationship with many government and private agencies, made a proposal to the Illinois Institute for Environmental Quality for funds for the project and received money for a five-month project.

As director of the project, I have certain convictions which greatly influenced the project and which you may well share:

1. Teachers do not feel prepared to teach environmental teachers, so it might help to lead them to some sort of environmental orientation.

2. Children want to learn about their environment; they are curious, but their experience in school often blunts or destroys such curiosity.

3. Many environmental education materials focus on pollution, on the degraded parts of the environment which upsets children; so, it is important to focus on healthy aspects of the environment.

4. Feelings are an integral part of environmental learning and should be stressed.

5. Environmental studies are interdisciplinary, while a scientific base is needed, it is important to draw in the social sciences (cooperation, decision-making), humanities (art, feelings and attitudes, language arts, and so on).

6. It is important to put the world together; learning is usually too fragmented.

7. It is essential to get people out into various environments -- not just have them read about them.

During the first two months we gathered information on traditional environmental study areas -- the ponds, prairies, nature preserves, and so on. I worked full-time and a colleague, who had no experience as a teacher or a writer but who is a delightful, curious individual, worked about one-fourth time. We were necessarily vague at first, not knowing what form the book would take; not having any idea how it would be organized.

We looked at the six counties and saw environments ranging from highly urban, to less crowded city, to suburbs of various economic levels, to rural areas. How could we write for such a range? The answer seemed to lie in considering environment as what is around you wherever you are, moving to areas farther away, and then to more remote sites. So this is the approach we used, and the book is divided into three main sections -- At Home, In Your Neighborhood, and Farther From Home.

One of our advisory committee members came up with the title Environmental Curiosity Sampler. This title has been a great boon to us because we could "sample" topics to include, not trying to be comprehensive and because we assumed that readers would use sections here and there and not use the book from beginning to end.

The form of the chapters evolved into a large section with general information, including many questions asking what the individual saw and how the individual felt about what was seen with activities included here and if it was appropriate. Otherwise, the activities were included in a section on "Things to Do". A list of books and other references were included in almost every chapter. Whenever lists of environmental study areas would be included, they were put on yellow pages (as in the telephone book), with addresses, phone numbers, and pertinent information.

The Sampler was done in a pilot project. Now we are working on Sampler #2 for the rest of Illinois. There will be slight revisions of some chapters, new chapters (Weather, Energy, Wastes as Resources, Who Makes Environmental Decisions), major revisions of the history, transportation, food, and land-use chapters. Some sections will be omitted and others added -- as with Shawnee National Forest and national wildlife refuges.

The reaction indicates great acceptance. Teachers see it as a teaching text, not just as a reference. Scouts are using it as a reference in some of their badge and awards work. Parents are using it to decide where to take their children. Though it was expected that elementary teachers would find it useful, high school teachers of art, history, and language arts find ideas in it; and high school science teachers find the lists of environmental study areas useful. People have indicated that they like:

1. the informal, attractive format;
2. generous amount of motivational material;
3. the simplification of complex material into a form that can easily be used with children;
4. the hundreds of ideas that can be used in and out of the classroom -- in language arts, history, art and science based on the discovery method;
5. its philosophy which is in direct harmony with modern principles of child and teacher growth and development;
6. its usability for camp counselors as well as teachers; and
7. its focusing on awareness, not on detail.

Because readers have indicated that the basic concepts and approaches used in the Sampler could easily be used in other parts of the country (and as some said, it was like a good novel - once you picked it up, you could not put it down), it is being suggested here as a model that people in other parts of the country might use in gathering information for the area where they live. The Sampler seems to be filling a need. We suggest it to you as a model for you to work with in looking at the environment where you are.

Most of the original printing of 4,000 copies were sent to elementary and junior high schools, public libraries, and environmental and youth groups in the six northeastern Illinois counties as well as state departments of education, a few national environmental groups, and chairmen of educational and environmental committees in the state legislature. Single copies were available to individuals who wrote to the Institute for Environmental Quality. This supply is about gone and arrangements are in the process for a second printing. When arrangements are made, it will be announced in the NAEE Newsletter in case any of you may wish to see a copy.

GENERAL TOPIC: ENVIRONMENTAL EDUCATION

A REPORT ON THE NATURE AND STATUS OF ENVIRONMENTAL EDUCATION

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Background

Environmental studies have been part of educational programs in some form throughout our history. Emphasis given to such studies has varied along with the characteristics used to give environmental studies an identity. As a substantive area, the subject matter has been taught in separate courses at all instructional levels and offered as part of other curricula in either planned or unplanned sequences. The affective component has received similar treatment ranging from an emotional response to a local situation, to analytic appraisals of attitudinal change over time. A result of this variation is an array of meanings attached to environmental education. This lack of uniformity is not unique; instead, it is a condition that tends to characterize other curricula areas as well.

Environmental issues (and possibly environmental education) during the past decade have become an increasingly prominent topic in the popular press and in some professional publications. Instructional media in this area were being produced at a rate that left the teacher overwhelmed with the range of choices available. The notion of finite resources seemed to have application to time and money only. Decision-making was being frustrated by the too numerous alternatives available. Further, the area generated common interests shared by a range of age groups, including faculty on the one hand and students on the other, elementary through senior high.

At the onset of the 1970's, some central notions became increasingly prevalent in the perceptions of environmental education offered in professional journals. A commonly expressed goal was the development of an informed society to bring about sound environmental policies. Programs needed to be broadly based, drawing from many curricula areas to enable the student to grasp the comprehensiveness of environmental issues. The U. S. Office of Education, in A New Role for American Education (1970), states "It has now become impossible to make wise decisions about our environment without an understanding of economics, political science, sociology, and the humanities, as well as science". This is illustrative of the broad concept of environmental studies held. The need to avoid conceptual isolation and over-simplification in educational programs and environmental action was clearly communicated. Similarly, the perils associated with curriculum changes that were restricted to course title manipulations or an "add on" were pointed out as possible contributors to a widening credibility gap.

The Environmental Education Act was signed into law October 30, 1970. Funds and authority under that legislation were to function as a catalytic agent within the Office of Education and to coordinate other governmental agencies and resources. Educators, environmentalists and legislators provided an unparalleled support indicative of the widespread public concern about environmental issues. All sectors of the country and all age groups were within the broad spectrum of the educational activities envisioned.

Accompanying the increasing number of journal articles and professional papers, environmentalism became a popular theme in instructional media. Curriculum guides, study kits, books, films, slides, recordings, transparencies, laboratory exercises, and other assorted materials were produced for the potential market that attracted public and professional interest. These accumulated activities were evidence that substantive changes were being planned or taking place in public education. Supportive data to document the implementation of environmental studies into existing educational programs were not readily available. Neither analytic descriptions of ongoing environmental curricula nor evaluative accounts of their effectiveness received widespread distribution; the latter, of course, is not necessarily peculiar to the area of environmental studies.

Purpose

The need existed to determine what was underway in terms of school practices. Research undertaken would help to ascertain the nature and extent of environmental studies. The identification and description of exemplary efforts would provide a basis for subsequent curriculum development, reduce some of the duplication of effort and expense associated with curriculum change, and lead to the generation of alternate approaches and concepts in this field. Knowledge of existing practices should contribute to the judicious management of essential resources consistent with the declared goals to be achieved through environmental education.

Procedures

Several curriculum questions were used to structure the collection of environmental studies data.

1. In schools actively engaged in environmental education, what emphasis is given to:

   a. conservation
   b. environmentalism
   c. human ecology
   d. ecological education
   e. population environment
   f. demography

2. At what level is the student introduced to environmental concepts, skills and attitudes?

3. What provisions are made for program articulation?

4. What teaching strategies and materials are employed?

5. How are environmental studies incorporated into the school program?

6. How is responsibility distributed among the professional staff?

7. What background does the teacher have for a role in an environmental studies program?

8. What provisions are made to evaluate student achievement and attitudes?

Two approaches were employed to gather information related to eight questions stated earlier. Curriculum guides and instructional resources prepared by commercial organizations, governmental agencies, schools, and other institutions were collected for study. In conjunction with the collection of printed materials, a schedule of direct observations and interviews was arranged as a means of assessing environmental education as practiced. Professional organizations, U. S. Office of Education, state departments of public instruction, and individuals were contacted to identify schools reported to have exemplary environmental studies programs. A seven-month travel schedule provided opportunities for site visitation involving nationwide representation. Schools in 22 states were visited, and curricular guides, state plans, and materials from 11 other states were reviewed.

Results

"Wise approaches to the defense of the biosphere need to be made a way of life in our schools." This statement is taken from Harold Shane's chapter, "Elementary Education: 1973-1985" in the N.S.S.E., 1973 Yearbook, The Elementary School in the United States. Results of the school visitations do not indicate that way of life has yet been realized in our schools. The seed appears to have been fertilized, although a long gestation period should be expected with the possibility of a somewhat erratic growth pattern.

Caution needs to be exercised in the interpretation of the results. Each site visitation provided information based upon a specific setting in time and place. While the sites were widespread geographically and (in excess of six months) were used in visitations to accumulate data and materials, the same factors also suggest that the ability to generalize from these findings be considered with appropriate reservations. Unfortunately, the individual teacher goes unheralded in countless classrooms conducting salutary environmental education studies that help to develop students' knowledge, skills and attitudes. Similarly, no mention is made of those classrooms where environmental studies are excluded from the students' program.

Environmental studies are included in school programs under numerous titles with considerable variation in content. Areas given emphasis may be broadly grouped.

An out-of-door nature study orientation was central to most of the programs conducted at the elementary school level. Plant and animal species identification continued to be found frequently. Ecological cycles, food webs, plant-animal interrelationships, and habitat diversity are illustrative of the cognitive components taught. A man-nature dichotomy was evident, particularly in programs with a field study element.

The affective domain at the elementary school level was a significant consideration in each program visited and in some instances, the program goal. Interests of young children provided instructors with a basis for organizing experiences directed toward selected attitudes and values.

In the junior and senior high school years, environmental problems provided a common thrust. Ecological realtionships, knowledge of plant and animal characteristics, and the impact of science and technology were included in environmental curricula. Man as an environmental degrader was often in evidence at a descriptive level that tended to simplify cause-consequence relationships.

Population growth and distribution, resource distribution, and utilization, and

family planning were generally not evident as parts of environmental education. The connotations developed around nature study, out-of-door education and conservation of earlier eras which persist in the establishment of parameters for what is to be taught. However, comprehensive curriculum models have been developed that reflect the 1970 statements of the Office of Education and positions have been published in professional literature. These inter-curricula models are broadly based to give the learner a more encompassing scope in his study.

Level of Introduction

Over half of the schools visited were engaged in either elementary or 1-12 programs. The programs specific to a grade or level tended to limit their instructional planning to the learner characteristics and program requirements normally associated with that level, and therefore, tended to function independently of the educational program being conducted at earlier and later levels. Materials and approaches to introduce the water cycle and food web have been developed for the primary grades while the same ideas are treated with more sophistication at higher levels. These two serve as illustrative models for structuring articulated curricula. Esthetic concerns and skills of observation were noted in multiple curricula areas and grade levels.

The elementary program appeared to be oriented more to the development of skills and attitudes than to the acquisition of concepts and generalizations. Although the accumulation of a factual information base to aid in describing environmental settings was a part of many teachers' instructional goals, skills involved in the analysis of soils, water and air quality were generally treated in senior high science courses. A few science teachers and students revised manuals and laboratory procedures to enable elementary students to conduct qualitative and quantitative analyses.

At the senior high level differing attitudinal positions and values were likely to be pursued. Studies of the pros and cons of an issue were relatively common approaches. A moralistic tone that nature is good, accompanied the pupils' introduction to environmental studies in the beginning grades.

Program Articulation

Systematic K-12 programs in environmental studies represent but a small minority of the ongoing or proposed programs. Concern for articulation between subject matter areas or between grade levels has been expressed, but provisions to accomplish that end tend to remain unfilled. Sequential development of concepts, skills and attitudes received treatment within the confines of curriculum or project goals that were specific to grade levels or areas. Conspicuously absent was the bridging of the fifth grade environmental education program with earlier and later grade levels, or the tenth grade environmental block in life sciences to other curricular areas. In too many instances the insularity associated with an ongoing curriculum activity was an acceptable condition to all but the student. The compartmentalization of environmental studies, allegedly trans-disciplinary by definition in professional literature, reflected the course credit arrangement of many teacher-preparatory programs and a class period tradition familiar to most. Articulated programs either within a school or within a district demonstrated a functioning communication system that enabled teachings and administrative staff members to view individual inputs or parts of a more comprehensive perspective.

An old established model constructed on a grid with grade levels forming one

axis and curriculum fields forming the other provided a familiar working framework for teacher teams involved in planning and writing environmental studies guides and materials. The existing curriculum areas and grade level organization of the district formed the base. Environmental topics and units were drafted and field-tested before grid location was determined. Curriculum changes to incorporate successful results were made simultaneously throughout the overall program without a major disruption.

Teaching Strategies and Materials

Environmental education programs appeared to involve more active participatory roles for the student than other school subject areas. The activities frequently were likely to be physical and conducted outside the classroom-litter clean-up campaigns, collecting soil, water and air samples, planting, following nature trails, etc. Investigatory atmospheres were noted at all instructional levels with students encouraged to perform laboratory exercises, conduct interviews, and tabulate data in search of background information.

Descriptive studies conducted in an expository manner were frequent in nature trail or museum type programs particularly for elementary pupils. Highly organized programs were likely to be more expository as the demands for services increased and the amount of individual attention decreased. The pupil role emerged as that of an observer, collector and recorder of descriptive information.

Instructional strategies that engaged the student in the study of different value positions were prominent in the schools visited. This is not to suggest that the programs were unbiased. Materials and activities were selected to develop or reinforce "positive" attitudes. Man's activities tended to be classified as either "good" or "bad" on the basis of immediate observable impact on some part of the environment. Decision-making processes employed in this area ranged from judgments formed primarily on emotions with little supportive information to carefully derived positions that grew out of intensive student research. The need for student research was recognized by most teachers; however, existing school practices often impose limits that are difficult to overcome.

Incorporation of Environmental Studies in School Programs

Reference has been made earlier to the grade placement of concept introduction, provisions for articulation and instructional approaches. Environmental studies from state departments of public instruction through the classroom were most often considered a part of the natural science curriculum. Within this type of jurisdictional arrangement, environmental education often became an "add-on" to an existing course under the tutelage of a single instructor. In some instances environmental studies were perceived as extra credit or volunteer group type projects.

If social studies teachers were involved in conducting courses in or related to environmental studies, it was not common knowledge. Occasionally, a social studies teacher or a faculty member not trained in science would be identified with this area. A few earth science teachers had organized systematic programs in environmental education. Circumstances at the elementary school level, particularly in self-contained classrooms, influenced placement differently. Elementary programs affiliated with a museum or nature center were distributed along a continuum. At one end was the isolated field outing labeled as the environmental program to directed instructional activities in each curriculum area being selected for their relevance to the topic. At both the elementary and secondary

levels, projects tended to be short-term, less than a semester in duration, rather than being conducted throughout the school year.

Responsibility for Environmental Education

"Who is responsible," and "How is responsibility distributed among the professional staff" are interrelated. The initiative for most the environmental education developments was the result, nearly exclusively, of an individual, usually a science teacher. Providing for the continuation of the program was also usually found to be the result of that teacher's effort.

The posture of school administrators varied expectedly; however, patterns were observable. More dynamic environmental education programs were located in school districts with administrative personnel who were not only interested in curriculum change, but were actively supportive in the implementation of environmental programs. Administrative responsibilities under these circumstances included budgetary support, arranging for planning, providing in-service, and exercising a leadership role in curriculum.

Teachers engaged in environmental programs also had building and district administrators who purportedly were interested. That interest was accompanied by several constraints. Program support was extended if no or only minimal monies were requested, the prearranged schedule was left intact, and community pressures were exerted. A passive, non-interfering attitude seemed to prevail. To attribute this to an indifferent attitude toward environmental issues would be inappropriate, however. The behavior exhibited would indicate that environmental education was perceived as a low-priority, non-critical item.

Teacher Preparation

Environmental studies viewed holistically with concepts and methodologies that cross curriculum boundaries and grade levels have implications for the preparation of instructional staff. Teachers involved characteristically had a high level of interest and a commitment to environmental education.

Motivation levels to pursue further education were high, although the availability of in-service or higher education courses were frequently limited.

Teachers interviewed said they depended upon departments or colleges other than education for additional background study. Again, the social sciences and humanities were seldom involved.

In-service courses, when offered, usually followed one of three patterns. Limited courses designed to meet a specific objective such as the preparation of pre- and post-activities to incorporate a nature-center field study into existing classroom programs were completed within short time periods. A second pattern, also with relatively specific goals but extending for longer periods, was product oriented. Curriculum development, or the preparation of instructional packets, would constitute the course goal. In the third pattern, in-service courses were offered to develop the teacher's background knowledge about the environment.

The first two patterns were the most common. These were usually organized and taught by district personnel as an extension of the teaching day. Development projects funded at either the state or national level were more likely to provide released time or summer schedules for in-service programs. The third pattern with its cognitive focus was offered, having the second pattern as a corollary. Schools,

institutions of higher learning and other allied agencies were apt to be involved in this pattern as a cooperative enterprise.

Evaluation of Student Development

Measurement of pupil achievement in this comprehensive area combines problems found in individual subject matter fields. Individual teachers adopted survey questionnaires published in periodicals to collect information regarding student attitudes; appraising student development in the cognitive realm did not differ from procedures employed by most teachers. Teachers and school administrators appeared to be more concerned about the development of "proper" attitudes; however, budget and personnel limitations were deterrents to satisfactory progress in the measurement of either area.

Summary Comments

The extent to which any generalizations can be made about the nature and status of environmental studies in today's schools is subject to serious question. A few observations and conclusions may have some applicability.

A word or two of caution is appropriate in the interpretation of pupil interests, abilities, and attitudes in population-environment studies:

> Most of our students, Kgn-12 have lived in a world with litter, air and water pollution, open field dumping, etc., as relatively common characteristics. The behavior pattern of tossing the beverage can or wrapper from the auto is more likely to be considered as normal than abnormal. There is little glory in clean-up exercises when the adults who preach clean-up exercise throw-away practices.
>
> Our students and teachers have lived in a society that has an established tradition of being capable of solving problems, or if not finding a solution, then making suitable arrangements for postponement of the issue. Having faith in our future has become somewhat of a motto. In addition, we seem to have become increasingly dependent upon someone else to solve our issues. The elusive "they" is most reliable.
>
> Our concern for simplified causes and consequences frequently gets in the way. This concern for immediacy has other dimensions as well. There are overtones of isolationism in terms of time and space. For example, coastal zoning may be treated as of minimal importance to the mid-continent teacher, student and citizen; a propane shortage for drying Iowa corn is considered a local issue quite removed from the coastal dweller. A fuel shortage may be inconvenient; however, there is always the possibility it might go away. Or, if that is not possible, we can rationalize by attributing the cause to some explainable circumstance.

While the popular media, governmental, industrial and private agencies have publicized environmental issues, our public schools have moved at a much slower pace in the development and implementation of systematic, comprehensive environmental education programs.

The complexities associated with a multi-curriculum perspective function as

constraints to development and implementation. Persistent hurdles such as duplicated efforts, inadequate resources, poor schedules and personnel shortages are confounded by divided responsibilities and notions of territoriality. In the chronology of curriculum change, experiences have not developed the competence always required to overcome previous mistakes.

Many school practices do not presently support environmental education as multi-disciplinary. It is included as a part of the science program, although the treatment given within the science curriculum may draw from the social sciences and humanities. Two related concerns emerge from this. Teachers who may have limited backgrounds outside their major assume responsibility for not only teaching in other disciplines but building conceptual and methodological relationships. The second concern is the lack of involvement of social studies in systematic environmental education programs, either in a leadership role or as contributors of their specialized knowledge and skills. As a result, if social, political, geographical, economical and historical dimensions of environmental issues are taught, they are often under the tutelage of faculty with inadequate preparation.

The pace for development and implementation of environmental studies is not likely to accelerate unless state and national budget and leadership support are increased. Casual, and often indifferent attitudes toward environmental studies held by teachers and administrators at the local level provide little initiative that would result in additional state and national resources. Present energy, or other crises, may function as another sputnik, to move ahead. However, some environmental efforts have been targeted as causes of the crisis.

Needless replication of effort could be reduced if existing professional organizations would assume responsibility for the development of a communication network to provide for the dissemination of information. Professional organizations also provide manpower resource essential for their expertise and for the leadership they could provide.

Traditions associated with some connotations of environmental education presently function in a restrictive manner that results in the establishment of narrowly defined programs that attempt to develop understandings and attitudes that are increasingly complex.

PROPOSED LEARNING OBJECTIVES FOR ENVIRONMENTAL EDUCATION

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One of the continual problems of environmental education is that there has been no determination on how much of it is enough. No one has really tried to say what an "environmentally literate" person should know.

This is in sharp contrast to the treatment given other subjects in which the target concepts for testing and evaluating a high school graduate are well established. In mathematics, literature and reading, for example, certain knowledge and skill levels are widely accepted. In fact, performance measures such as the Scholastic Aptitude Test are used to measure learning achievement. The situation for environmental learning is considerably more cloudy. Controversies over issues such as outdoor techniques or urban content have taken precedence over any real discussion of what should be learned on environmental subjects during an individual's basic education.

The uncertainty on learning objectives, however, has not caused environmental teaching to cease. Federal expenditures during fiscal year 1972 were $24 million, and expenditures by volunteer groups, industry, plus State and local education agencies, were many times that level.

The difficulty has been and still is that there is no way to tell when the expenditures and efforts are conveying the intended environmental concepts.

As a partical solution to this problem, the Federal Interagency Committee on Education (FICE)[1] is proposing a group of learning objectives for consideration by students, teachers, and others in the education community. These objectives are intended to cover the learning needed by an individual to understand and to help encourage federal activities related to environmental quality.

The agencies contributing to the list were: the Environmental Protection Agency, the National Park Service, the Soil Conservation Service, the Forest Service, the Office of Education, the Office of Sea Grants in the Department of Commerce, the National Science Foundation, the Bureau of Land Management, the Energy Research and Development Administration, and the Council on Environmental Quality.

The list of learning objectives is designed to cover only the content and not values and skills related to the environment. There is no attempt to underrate the importance of the latter two items. The effort is rather to <u>start</u> the discussions with cognitive learning (knowledge) objectives.

[1]The Federal Interagency Committee on Education is composed of the senior education and training persons in the major departments and agencies. Through monthly meetings chaired by the Assistant Secretary of Education, the Committee makes policy recommendations on a wide range of education issues.

The list of objectives is organized around three major categories: (1) fundamentals of earth's environment, (2) humans as a part of earth's ecosystems and (3) harmonizing human needs with ecosystem limits. Although the concepts are briefly stated in most cases, their complexity should not be underestimated. For example, the concept of materials cycling and recycling through ecosystems is one which often requires many hours of consideration in the outdoor classroom or laboratory setting before being assimilated by an individual.

The concepts listed in the section on harmonizing human activities with the ecosystems are especially important. There are many different names and versions for this list of techniques. The steps have been variously known as the scientific method, the systems approach, analytic problem solving and systematic learning.

The formulation provided in this list has been adapted for environmental problem solving. In actual situations some of the nine steps may be combined or omitted.

The last learning objective - the individual role in environmental quality - should also be stressed. A high level of consumer demand for polluting and resource-wasting items in modern society is a fact. However, the environmentally preferred consumer choices could be learned by the school age population at the same time that such subjects as traffic safety, fire prevention and personal hygiene are being learned. (Such learning need not have an adverse economic impact, because the demand for clean, resource-conserving products would itself be an economic stimulus.)

Finally, the list of learning objectives is not intended as the COMPLETE ANSWER. The list is proposed as a guide for textbook writers, curriculum supervisors and other educators. Comments and suggestions for improvement are welcome, and others wishing to formulate an entirely different list of objectives to compete with this proposed list, are also encourage to do so. These concepts have not been officially adopted by any group, nor will they be "implemented". The purpose of the list is simply to begin a national discussion on the learning objectives for environmental education.

Comments and questions may be addressed to: Environmental Education Objectives (A-104), Office of Education and Manpower Planning, EPA, Washington, D. C. 20460.

PROPOSED ENVIRONMENTAL CONCEPTS FOR THE HIGH SCHOOL EDUCATION LEVEL OF ACHIEVEMENT

I. Fundamental concepts about Earth's environment.

A. Earth's environment is a whole.

1. Earth's environment is made up of air, water and solid material that constitute a complex, totally interrelated life support system called the "ecosphere".

2. The ecosphere is composed of interacting systems called "ecosystems", which are composed of three parts: (a) physical components (climate, rocks, water, etc.); (b) organisms (humans, reptiles, bacteria); and (c) interactions among them (competition, erosion, decomposition, etc.)

3. Earth's ecosystems are finite.

4. All living things have specific roles or "niches" in ecosystems; some are wide, some very narrow.

5. Living things are interdependent with one another and with their physical environment.

6. The functioning (operation) of individual organisms results from interactions of their heredity with their environment.

B. The ecosphere is a dynamic, chaning "super-system".

1. Simple ecosystems develop on bare mineral surfaces (water, sand, rock). As ecosystems develop, their living things contribute to and change the character of the system. These changes enable more types of organisms to live in the systems, thus further changing its character until it reaches a dynamic equilibrium.

2. As ecosystems develop, their niches become more specialized. Changes in systems interact with changes in organisms that result in closer adaptation of organisms to their niche.

3. As ecosystems mature over long periods of time, diversity of organism types increases in them. Individual organisms come and go, but the character of mature systems remains. As ecosystems mature, they become more resilient to disturbances, resulting in greater ecosystem stability.

C. Materials are the substance of ecosystems; energy is their driving force.

1. Materials are continually cycling and recycling in and among ecosystems. Examples are the water cycle, the carbon cycle, the nitrogen cycle, etc.

2. Energy, by contrast, moves linearly through ecosystems. With each conversion, energy loses some of its force, until it is dissipated.

3. Life itself is a chemical proces, dependent on the environment for the energy and nutrients needed to sustain it. Energy comes originally from the sun, nutrients from mineral components of the environment.

4. Green plants, through photosynthesis, convert inert minerals of Earth and sun's energy into high energy organic compounds that power all life processes. Respiration is used by organisms to release this energy from compounds.

5. Energy and nutrients pass through food webs from primary producers to herbivores to primary carnivores to secondary carnivores, etc., and finally to decay organisms.

D. Each system has an ability, called "carrying capacity", to support given numbers of each species within it. Population numbers fluctuate from time to time, depending on variations in components of systems, but remain relatively stable unless the system is altered in some significant way.

1. Carrying capacity is governed partly by the nature and intensity of limiting factors and partly by the genetic makeup of system organisms.

2. Physical, chemical and biological factors of systems interact in various ways to limit growth, reproduction, and existence of species.

II. Humans are an integral part of Earth's ecosystems, and are entirely dependent on these ecosystems for their life support.

A. Humans are highly adaptable organisms and have a high capability to mold conditions to their needs.

1. The limiting factors that control ecosystems and their organisms ultimately control human activities.

2. Some limiting factors are specific to humans: level of knowledge and intelligence; accumulation and transmittal of knowledge; level of technological development; type of sociopolitical structure; political limits on access to natural resources; level of economic backing; cultural proclivities.

3. Human technology and social institutions alter limiting factors: For example, (a) pollution can harm human health and can reduce the ability to ecosystems to support life; (b) human settlement, and development and use of resources can destroy habitats of other species; (c) human population can greatly expand and retain its numbers; (d) technology can delay the impact of limiting factors, but not remove them entirely.

B. Humans are more capable of changing how ecosystems operate than any other species. The rapidity and magnitude of changes they can make are often global, immediate and irreversible.

1. The influence of limiting factors can be stretched by human technology but not eliminated by it.

2. The capacity of ecosystems to support life can be maintained, increased or reduced.

3. Most natural systems are self-sustaining; most technologically developed human systems require subsidies of energy and materials.

C. Standards of living and quality of life are influenced by human adaptability, technological capability and psychological, cultural, historic, economic, political and social values.

III. Human needs and activities must be harmonized with ecosystem requirements.

A. The steps are:

1. recognizing importance of ecosystem changes;

2. identifying causes of ecosystem changes;

3. distinguishing ecosystem changes that can lead to beneficial

results from those that can lead to detrimental results;

4. analyzing and evaluating the effects of feasible policy alternatives on ecosystems, including humans and their economy and society;

5. arraying alternative action strategies that would maintain and enhance beneficial ecosystem changes and would reduce or stop detrimental ecosystem changes;

6. weighing alternatives according to a wide variety of environmental, social, political and economic criteria (Such weighing of criteria will vary with the circumstances of society - good times, war, famine, flood, etc.);

7. adopting a policy and choosing the actions to implement it (Policy adoption occurs at individual through global levels, consciously or unconsciously.);

8. carrying out adopted policy and actions to implement them is the successful completion of the process; and

9. monitoring effects of implemented policies and actions is essential to keeping them adjusted to changing ecosystem needs and human perceptions. This step should cycle thinking and action back to the first step of recognizing ecosystem requirements.

B. Some of the U. S. national policies that can harmonize humans with their environment are:

1. The use of natural resources is ro be studies and managed to protect human interests as well as the environment. Resource availability is to be prolonged by careful extraction, processing, use and recycling. Examples: National Environmental Policy Act, Resource Recovery Act, Mineral Leasing Act, etc.

2. Use of renewable resources such as fertile soil, clean water, breathable air, plants and animals are to be enhanced by protecting and conserving them. Examples: Soil Conservation Act, Forest Services Acts, Clean Air Acts, Water Quality Acts, Taylor Grazing Act, etc.

3. Some human activities that endanger resources, ecosystems, and human health have prescribed limits and standards for their conduct. Examples: FIF, ERA, Pure Food and Drugs, Ocean Dumping, Atmospheric Test Ban Treaties, etc.

4. Preservation of all biomes and habitats for rare and endangered species and national historic and scenic sites is to be assured. Examples: National Park Service Act, Wildlife Preservation Acts, Antiquities Act, Marine Mammal Act, Rare and Endangered Species Act, etc.

5. Use of land must employ stewardship principles rather than consumption. Examples: Coastal Zone Management Act, Outer Continental Shelf acts, Land Use Policy acts, Industrial Facility Siting acts, etc.

6. Critical factors in ecosystems, in human health, and in property will be monitored to establish and assure safe limits for various components. Examples: Atomic Energy Development acts, Non-Nuclear Energy Research and Development Act, etc.

C. Some issues awaiting the formulation of national policy are:

1. Strip mine land rehabilitation

2. Land use

3. Toxic substances

4. Population control

5. Industrial plant siting

6. Materials conservation and recycling

7. Ecosystem research

8. Strategic Arms Limitation Talks

D. Individuals, through their actions and choices can minimize their own burden on the biosphere and harmonize their existence with the environment.

1. Pollution control and resource management have an individual component of self restraint and responsibility.

2. Environmentally-preferable consumer choices can be identified and practiced by the individual.

ENVIRONMENTAL-ENERGY-CONSUMER-CAREER-COMMUNITY EDUCATION AND/OR A FLEXIBLE APPROACH TO ENVIRONMENTAL EDUCATION FOR TEACHERS

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Environmental education can be an exciting, viable teaching/learning experience. How and what we make it depends to a great extent upon our local situation, our ingenuity and our flexibility. When we see environmental education as a comprehensive "total-education in the total environment" (Eblen), the directions and implementation methods multiply and expand.

After spending much time and thought describing a flexible approach to environmental education for teachers, I decided that much of what I had written was old hat for most of you and that my final three points were the only major ones worth sharing with the whole group. Thus, part of this paper is available in written form for those of you interested in details of some of our efforts at Bowling Green State University and some ideas for your own adaptation. The paper includes a list of some of our favorite resources. My three major points briefly stated are:

1. Approach teachers from "where they're at". Don't waste time theorizing if they're already into environmental education or neglect the ground rules if they still think it's only conservation education.

2. Be action-oriented. Don't talk at them, involve them.

3. Be participant-centered. Help them work with what they've got.

But, we'll get back to these points a little later.

First, I would like to share a few concerns about environmental education and teacher education in general. We like to do a lot of lamenting, preaching and prophesying. We worry about support and administration of our programs, the quality (or survival) of life in 1980 and our own personal/professional growth. We often view new programs as threats that might take some of our precious limited resources away from environmental education; some of us push for state plans and certification to legitimatize our field and all of us wonder how dense "they" can be if they don't really see the innate importance of our environmental education program. "Just wait," seems to be the attitude, "They'll find out! When the energy crisis hits harder and resource scarcities are besetting the economy, then they'll wish they supported us in 1975!"

With educators fighting for jobs, school boards pushing for back-to-the basics and financial belt-tightening eliminating "frills", how do we provide opportunities for teacher in-service training and maintain our environmental education efforts? My premise is that we need to become more flexible.

The Education Act Amendments of 1974 provided monies for career education, consumer education and community schools. Many school districts are now developing and implementing these types of programs both with and without federal assistance. If this is the wave of the future, let's ride it. Certainly the aims of such programs as career, consumer and community education are congruent with our environmental education efforts, and cooperative activities require only a slight shifting

of gears. Workshop support, curricular materials and school district committees provide convenient "ins" for the interested environmental educator.

David Archbald of Environmental for Learning, Madison, Wisconsin, and the Minnesota Environmental Sciences Foundation have done some work in correlating career education with environmental education. Career education as introduced in the book Careers from the Minnesota Environmental Science Foundation and the Robbinsdale area schools "deals with the present life interests and curiosities of the individual. It causes youngsters to think in new ways about themselves as individuals often through use of such devices as role playing and simulation. Self is not only a learner but a worker, an earner, a member of community and a decision-maker".

The career education elements or components of self-awareness, career orientation and exploration and decision-making, especially lend themselves to exposure to environmental issues and concerns. Using life-work planning strategies aids student adjustment in a changing world and increases any career education program's effectiveness. A special resource useful for this emphasis is What Color is Your Parachute?! A Practical Manual for Job-Hunters and Career-Changers (only $4.95 from Ten Speed Press).

Consumer education, as defined by Dr. John Hug, our Ohio Department of Education Environmental Education Consultant, "assists the individual in using his/her resources to accomplish personal and family goals which are within the public interest". Consumer education programs can include resource conservation, energy usage and food production/distribution as just a few examples of environmental issues. A look at April's Learning Magazine, "Kids and Money", could open many alternatives for interdisciplinary correlations.

The community focus has been a part of many environmental education programs from the very beginning. Concern with local issues and delving into the special problems of delicate community/environmental interrelationship and balance have provided many educators with meaningful, ongoing problem-solving projects. "Breaking into Your Community" from the Golden Valley People provides useful activities for implementing a community study. The frequent emphasis in community schools on continuing education and life-long learning can provide a natural opening for dealing with important environmental concerns at the adult level.

Bicentennial observations and celebrations provide opportunities for all kinds of environmental investigations. The People's Bicentennial Commission invited Barry Commoner to speak at Concord. The Cuyahoga Heritage Program of the Institute for Environmental Education in Cleveland is a prime example of school/community cooperation in this area. The Johnny Horizon's materials can be used effectively in lower grades.

Energy education is something many of us have become involved in, sometimes voluntarily and sometimes because of other pressures. Again the need is there, so let's fulfill it. Get the NEA's Energy Choices for Now: Saving, Using, Renewing for a start or "The Citizens Action Guide to Energy Conservation - Individual Action Check List" to assist in generating an energy ethic.

The alternatives are there. We need to work with practicing teachers, involve pre-service teachers as well and be willing to widen our horizons to make the greatest impact.

Now I would like to come back to the points I made earlier about taking people from "where they're at" and being action-oriented and participant-centered. It always bothers me somewhat speaking before a group of this nature when I realize many know a whole lot more than I about the subject with which we're dealing. I also strongly believe in the major points stated above, so I would like to ask your cooperation.

A variation of a values clarification strategy I would like to ask you to do is this: Please write down three or four teacher education approaches you have used or would like to have an opportunity to use. Break into groups of four. Each person gets one minute to share the list and why he/she chose those activities.

Some suggestions that came from this activity are:

Use acclimatization
Use NFS (National Forest Service Process Approach)
Use ES (Essence Cards)
Get an appropriate text (e.g., Junk, Junk, Witte & Witte)
Identify teachers with preliminary interest
Use field experiential activities (three responses)
Integrate supplementary materials into regular course work
Use field activity module--with teachers, then kids (two responses)
Use T. V.
Use EE programs within Colleges of Education
Encourage involvement - "hands-on-approach"
Population education (three responses)
Around-the-school activities, using the materials at hand
Summer workshop for teams of teachers (i.e., science, social studies pair)
Urban environment activities (i.e., see Ron Jones "Your City Has Been Kidnapped" - Addison Wesley)
Write a personal environmental impact statement
Write a "declaration of inter-dependence"
Use the audio-tutorial approach
Idea exchanges

The diversity and scope of the above activities shows that many are doing what we've suggested. We can only hope that this session provided some stimulus for those looking for ideas to adapt and implement in their own situation.

A Flexible Approach to Environmental Education for Teachers

Teacher education, as we are all aware, can occur on many levels and through diverse channels. Formal and informal programs and courses, pre-service and in-service orientations, mini-courses, workshops, organizational meetings, topic-oriented conferences or activity days, curriculum committees and guest speakers or "doers" are but some of the options available. The more alternatives you can utilize, the greater the impact of environmental education on the teaching community.

Let's deal briefly with some of these options. At Bowling Green State University we have an Environmental Education Program based on a three-course sequence: Philosophy of Environmental Education, Investigations in Environmental Education and our Spaceship Earth seminar. The two courses are taught during the same quarter, with the Philosophy of Environmental Education focusing on the methods, materials, and techniques of the field. These also are offered as a summer

workshop for those who find "after school" courses difficult. The Spaceship Earth seminar is an integrating, synthesizing experience that provides the opportunity for students to begin "teaching/learning the earth whole" as McInnis succinctly puts it. All of these courses are available to both pre-service and in-service teachers, and an environmental education "endorsement" or credential describing their preparation is given for successful completion.

Pre-service teachers who wish a broader, more comprehensive background in environmental education may elect one of three tracks: Track I, Environmental Science and Health; Track II, Social Studies and Humanities; or Track III, Environmental Education Concentration. These emphases require supportive course work which is drawn from an environmental education course pool that that increases the student's interdisciplinary experiences while allowing for concentration on a certification area. In-service teachers often take the sequence as an elective within a graduate program or simply for their own professional growth.

Mini-courses or workshops can be incorporated into extension programs or offered as a part of teaching in-servicing. Local teacher study days (or enrichment days), existing graduate courses and organizational meetings (e.g., science or social studies teacher organizations and local Education Associations or Federation of Teachers conferences provide excellent opportunities to present your cause.

Topic or activity-centered days are becoming more popular in certain areas of the country. In most instances an environmental education-oriented group sponsors these events. However, if you lack such an organized group, start one or work through an existing group (e.g., district soil and water conservation offices, park naturalists, communication action or center personnel). Such emphases as energy education, food distribution/production, resource conservation education and how-to-teach them are germane and interesting topics for such sessions. Evening or weekend sessions at minimal or no cost with much provocative, exciting, advance public relations are advisable. Other useful means of relating environmental education concerns to teachers are newsletters and resource centers. Bringing in an enthusiastic environmental education "doer" to provide a fresh perspective can enhance your efforts. Sometimes just a get-together to share successes can provide teachers with much incentive and information for new EE approaches.

Some key points in any of these teacher education approaches are:

1. Approach them from "where they're at". Don't waste precious time defining and theorizing if your audience is already aware and involved. If definitions are necessary, do it concisely and quickly, preferably in a visual way.

2. Be action-oriented! Don't talk to them. Use values clarification strategies, games, field activities, the Essence cards or environmentalizing your classroom exercise. (See "Resources" below)

3. Be participant-centered. Help them work with what they've got. Use their interests, facilities, projects or curriculum orientations as spring boards for additional EE growth. The contract system is one we've found helpful; some copies of recent efforts are available.

These are just a few approaches we have found successful. Your imagination and enthusiasm are the only boundaries to creative environmental education for teachers.

(For further details on the above, please feel free to contact the author, Judy DuShane, Environmental Studies Center, Bowling Green State University, Bowling Green, Ohio 43403 (419) 372-0207)

Some Helpful Resources for Meaningful Teacher Education

"The Essence Cards", EE open-ended learning activities, developed from the Environmental Studies Project (formerly in Boulder) now available from: The Innovative Division, Adison-Wesley Publishing Co., Sand Hill Road, Menlo Park, CA 94025. $19.98.

Don't miss!! Concerning Spaceship Earth: Environmental Education Activities Manual by Dr. Wm. B. Stapp & Ms. Dorothy Cox. A six book set starting with background, bibliography, games, and A-V's and providing concept, valuing and problem-solving activities for every grade level. $8.50 + 60c mailing per manual (1012 pp.). Write to D. Cox, 30808 La Mar, Farmington Hills, MI 48024. ($6.50 for 10 or more)

The "Bible" of Values Clarification by Simon, Howe & Kirschenbaum, Values Clarification: A Handbook of Practical Strategies for Teachers and Students is available from Hart Publishing for $3.95. Use, adapt, enjoy!

Using the "Investigating Your Environment" series from the Forest Service, U. S. Dept. of Agriculture (Supt. of Documents, Stock No. 0101-0234, 95c), try the process approach.

Get into games. Role-play. Ask teachers to look for "Make Your Own World" by Coke. Local Coca-Cola bottlers distributed them a couple of years ago and many are gathering dust. Those that are resurrected are student and teacher "favorites". (El-Jr. Hi). High school teachers write for a free copy of The Eco-Acres Game" from Maine Public Broadcasting Network, Alumni Hall, Univ. of Maine, Orono, ME 04473.

Make your own resources. Develop outdoor activities using the site, games concerning local issues, and values clarification strategies adapted for germane topics. (See handouts on "V.C. Strategies for EE" and "A Lesson Plan for Investigating Classrooms".)

LET'S NOT FORGET THOSE WHO MAKE A DIFFERENCE

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The topic of this session is entitled Education To Improve the Quality of Life. We are all concerned about the quality of life, yet none of us really know what we mean by quality of life nor how we measure it. Most of us here probably equate quality of life with the quality of the environment -- an assumption with which all of society would not necessarily agree. Our family life, our financial situation, our conveniences, our national security, etc., are also important considerations. I base my thinking on the assumption that quality of life is directly related to the problems that exist and society's perception of those problems. Subsequently, I feel that the role of environmental education is to deal with quality of life through environmental problem-solving; recognizing that environmental problem-solving is part of a much broader context.

The hyphenated word "problem-solving" has been used as loosely and without definition as the words "quality of life". Yet environmental education by most definitions is problem-solving oriented. I think it would be valuable to understand better not only what problem-solving involves, but to also look at the necessary connection between problems, problem-solving and education.

Throughout my teaching, people have agreed with my definition of "problem" as the individual's identification of a gap between what actually exists and what he would like or expect to exist. (I mention this general acceptance only to avoid using this time to make my point.) For example, we have a problem if we want to go to several concurrent sessions at this conference but in reality can only be in one place at one time. Problem-solving, therefore, is not making the symptoms go away but rather reducing the gap between the expectation or want and the reality. Sitting in at one of the sessions does not solve the problem. What would solve the problem would be the decision by the conference committee not to hold concurrent sessions.

If problem-solving is the lessening of a gap between our expectations and reality, then where and how does education fit in? From my point of view, education - including environmental education - often widens that gap. For example, if we teach about all the things that "could be" - the model city, the socially responsible industry, the society that is motivated by ecological rather then economic principles, etc. -- then we are only creating more expectations and wants. We are identifying problems, but are we solving them? On the other hand, if we collect more statistics on air and water pollution, if we have better mass media coverage of environmental problems, if we uncover new environmental hazards, then we are changing reality. We are realizing something exists which we didn't know before. For example, urban air inversions have become a health problem because modern statistics have correlated increased death rates to days with inversion layers. Again, we are identifying problems - but are we solving them? To me it is no wonder that our youth have become cynics or idealists who falsely assume someone else will solve all our problems. It is no wonder that adults avoid educational programs. They have enough problems already.

If environmental education is problem-solving education and if problem-solving is lessening the gap between expectations and realities, then there is certainly no reason why adult environmental education is not just as integral and cannot

be just as successful as K-12 and university environmental education. I feel that good adult environmental education is a lot easier to accomplish. Working with decision-makers, working with the citizenry who better understand the complexity of the problems, working with those who are in a position to solve the problems makes it much easier to show how to lessen the gap between expectations and realities. These are the people who make a difference. In a democratic society every citizen is a decision-maker and every citizen has the potential to make a difference. In our daily lives we continually make decisions. Obviously, some make more decisions and some make a greater difference.

Even though I feel it is easier to work with those who make a difference, there are in fact very few who are concentrating their efforts on adult environmental education. I feel the reasons are the following:

1. Adult environmental education is not recognized as a separate field of environmental education. It is amassed with the information dissemination services of membership groups, with the lobbying of environmental action groups, with the local lectures at the Kiwanis Club or Garden Club and with teacher workshops of continuing education departments. This conference, for example, has no session designated for exchanging ideas on good adult environmental education. The national conference planned this July in Denver has subdivided into seven categories with the category of Private Conservation Associations to represent lobby groups, private institutes, and membership organization such as the Humane Society, the League of Women Voters, and the National Education Association. The Alliance for Environmental Education has the same diverse mix. Any group who wants to initiate good adult problem-solving education has to distinguish itself in some way from other very different groups.

2. Most educators end up within a formal school system. It is an easier route because it is a permanent institution, with a steady (although undependable) financial base that offers advancement, fringe benefits and security. Small private endeavors are more of a risk. There is much less certainty and security. Therefore, educators usually locate in K-12 or in universities, and those who want to reach adults may end up with adult education departments at universities. These departments usually have minimal influence, power base and money within the university and are often resistant to change.

3. Most adult education is the product of one or two person's ideas. Someone decides what would be a good "course" and offers it. Someone decides this year's theme for the annual conference. Someone decides what someone else should know. The result is most often an educational experience where the participant is "being told"; "being enlightened" or "being saved". The participant is not given credit for his potential contribution. Educators are beginning with what they think people need rather than with expressed needs or wants.

4. Most adult education is designed for a homogeneous group of people. Educators talk to educators, engineers talk to engineers and planners talk to planners. Without a mixture of perspectives, the learning experience is limited. Without a mixture of perspectives, the problem-solving potential is extremely limited.

5. The most difficult obstacle to good adult environmental education,

however, is the lack of good adult education techniques. While schools are progressing with modules, field trips, the "process approach", self-directed curricula, etc., adults are still being trapped in a convention meeting room and lectured to. If they are lucky they get some time for discussion. Experts are asked to give talks; the participants are asked to listen. Where is the learning? The experts are not chosen for their teaching abilities nor are they allowed to deviate from the "you have 30 minutes to read your paper and make your presentation" instructions. They seldom have the opportunity to use the real world for their classroom. The number of participants is usually very large, reducing the opportunity to discuss ideas, exchange ideas, and develop problem-solving processes.

These obstacles are certainly surmountable. For example:

1. The National Association for Environmental Education, the Conservation Education Association, the American Society for Ecological Education, departments of education, etc., could recognize that adult environmental problem-solving education is a separate field. Memberships, conferences, and programs could reflect this recognition.

2. Private educational organizations, groups and institutes could disseminate more information about their activities through newsletters, reports and journals. In addition they could better communicate between each other to share successful programs and administrative assistance. These actions would not only make more educators aware of non-formal efforts, but also establish some organizational network that would provide more visibility and recognition to educators working with these groups.

   Public institutions could set up separate institutes or programs that dealt specifically with problem-solving adult education and abandoned the classroom-convention approach. Metro State College in Denver has such a program called Learning for Living. It is interesting to note that Learning for Living began as a private effort and then was invited to become part of the college.

   Funding sources could increase their grants to adult education. Many industrial foundations donate money to K-12 programs without taking advantage of the public relations they could have with adult programs. The U. S. Office of Education, Division of Technology and Environmental Education, has been an excellent stimulus to private efforts. Pressure to have more DTEE funding go to public systems could seriously affect good adult problem-solving education. Research and training money now budgeted could apply to some educational components.

3. Adult education could start with an expressed need. Programs could be planned by a committee that not only included educators, but also prospective participants, experts in the field, etc. Rather than looking for a general audience, educators could deal with organized groups such as local unions, trade associations, professional organizations, etc. This would insure that particular problems were being addressed in a practical manner.

4. If education were related to actual problems, then a diverse group of participants could be identified to deal with the problems. For example,

if public school K-12 educators wanted to know how to secure additional funds, the participants could include the educators, educational administrators, the school board, state budget department representatives, the district legislators, educational committee and subcommittee legislators, parents and students.

5. Adult educators could abandon the classroom-convention approach and experiment with new ideas such as simulations, potluck suppers, debates, retreats, etc. Thorne Ecological Institute has the following guidelines for a seminar:

   a. The participants are from diverse backgrounds. This is a drawing factor and also turns out to be the most valued aspect of our seminars.

   b. An advisory committee helps design the seminar. This committee represents the cross-section of expected participants, is influential in the respective fields and has some familiarity with Thorne.

   c. The program is action-oriented and takes place in the field, not the conference room. There are no papers given and speeches are rare.

   d. Case studies or case problems are an important part of the program. They insure "real world" application of ideas and encourage value confrontation rather than polite conversation.

   e. Resource leaders are specifically chosen for the designed program. They are chosen for their expertise, their teaching abilities, and their general attitude. The ratio of resource leaders to participants is between 1/5 to 1/10.

   f. Seminars are at least 2-1/2 days and there are always fewer than 50 participants. This insures time and opportunity for good group interaction and sequential learning activities.

   g. Participants are housed together and free time is allowed for participant and resource leader interaction during meals, social hour, and optional evening activities. Much learning takes place at these times.

   h. The setting is appropriate for the seminar content. When possible, it also has additional appeal.

We have an annual Seminar on Environmental Arts and Sciences, workshops relating ecology to the issues of the day, corporate seminars, resource development impact seminars, land use value clarification workshops and many more programs to share.

These are just some solutions. Perhaps you can think of others. I hope, however, that you will do more than think about solutions. What could <u>you</u> do? In summary, the quality of life depends upon the development of problem-solving environmental education. Let's not forget those who make a difference.

VOLUNTEER ENVIRONMENTAL ORGANIZATIONS AS ENVIRONMENTAL EDUCATORS--PROBLEMS AND POSSIBILITIES

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My objective in this report is to discuss the actual and potential roles of volunteer environmental organizations in environmental education. My concern is with such national organizations as the Sierra Club, Audubon, The Wilderness Society, Friends of the Earth, the National Wildlife Federation and others of this type. I will mention these organizations in a general way, referring to the organization as a whole and cognizant that within each organization there is tremendous regional and local variation in environmental education programming. I will argue that these organizations have a significant role to play in environmental education and that they have failed to achieve their potential in this dimension of environmental activism.

A definition of environmental education is necessary in order to frame my remarks. When I speak of environmental education, I refer to the process through which a person learns about his environment as a system of which he is an integral part. In doing so he learns of the problems of that environment, his relationship to those problems, ways to help in resolution of the problems, and he becomes motivated to assist in this resolution. The environment to which I refer includes, at its farthest extent, the biosphere, and at its smallest extent, the self. The process occurs within the institution of the school at all levels of the curriculum and outside of the institution. I view the process as lifelong.

I will speak to my subject from several perspectives. On one hand I am an active member of several environmental organizations: Audubon, where I have for several years served as a chapter president; the Sierra Club, where I serve on their National Environmental Education Committee; I have participated in and assisted with several educational programs of The Wilderness Society, and I hold memberships in Friends of the Earth, the National Parks and Conservation Association and The National Wildlife Federation. On the other hand, I am a professional environmental educator and work with people of all ages on environmental education projects. My principal efforts are with college students, many of whom are training to be teachers. In this capacity I have had the opportunity to obtain broad knowledge of what I call the world macroproblem and of developments in the growing field of environmental education.

Historic Environmental Education Efforts of Environmental Organizations

Let me begin my analysis of the situation with the obvious observation that environmental organizations have from their beginning been important vehicles of environmental education. An acute problem of some sort was usually the catalyst that motivated people to form the group. The battle to preserve Yosemite Valley motivated John Muir to found the Sierra Club; severe reduction in plume bird populations led William Brewster to start the organizational ball rolling that ultimately resulted in the National Audubon Society; a group of wilderness advocates, sensing a deep threat to the idea of wilderness in the mid-thirties, founded The Wilderness Society. People organized to do battle

over an issue, and from the beginning one strategic approach they used was to provide the interested public with information about the group's concerns and the reasons for this concern. Articles were written for Harpers, Century, The Atlantic Monthly and other general periodicals. Ultimately, all of the organizations founded their own periodicals as outlets for their ideas. Environmental advocates disseminated their ideas in this medium, providing information and often rhetoric which they hoped would motivate people to act in support of their position on an issue. A measure of success in raising public awareness and concern was achieved by this method, and some of the conservation battles were won.

This media approach has, in my view, grown today to be the core of the educational effort of many conservation organizations. People like Muir wrote books which people read widely, and book publishing has become a major program complementing periodicals. David Brower, of course, brought this medium to its present height in the environmental movement with his exhibit-format publishing effort, first with the Sierra Club and now with Friends of the Earth. While all of this is good, my feeling is that it is an inadequate educational strategy today. It reaches only those who read and who have the money to join expensive organizations and buy expensive books. Further, often the messages produced in this fashion reach only the "elect," those who are already solidly on the side of the publishing organization. This medium does not reach into the lives of a large part of the population in need of environmental education.

Environmental organizations engage in other educational methodologies. National Audubon, for example, has an extensive program in addition to its publications. Its annual Wildlife Film Series is viewed by tens of thousands nationally. It conducts workshops of various types for teachers and other interested people, provides educational materials in the natural sciences and offers a public information service. Further, it has set up its national organization in such a way that a healthy proportion of the membership fee paid by each new or renewing member is channeled into the treasuries of local chapters, now 335 in number nationally. These chapters are urged, albeit not vehemently, to promote and develop environmental education programs to meet the needs of local communities.

The Wilderness Society embarked a few years ago on a program of leadership education quite different from Audubon's approach. As they worked on wilderness issues, the Society noted a scarcity of citizen leadership in environmental struggles in many parts of the country. A manpower development program seemed necessary, so they initiated a series of "Washington Seminars" in which they gave participants intensive exposure to the processes of governmental decision-making. These seminar graduates returned to the field, and later some were given further training, this time in what might be called a "human potential" approach to leadership education. These trainees then were expected to return home and carry out educational programs that would increase the knowledge and confidence of potential citizen environmentalists. Thus, the Society hoped to involve more people in debates of environmental issues throughout the nation. This program, called "Operation Grassroots," is underway now around the country.

Other organizations are probing for ways to reach people. The National Wildlife Federation offers "Conservation Summits" several times yearly, but these are small in size, few in number, and rather expensive. Ranger Rick magazine is a unique contribution to the environmental education of children, complementing nicely their International Wildlife and National Wildlife magazines. The Sierra Club has established a national environmental education committee which is

exploring paths toward meaningful contribution to environmental education. A review of the environmental education efforts of these organizations indicates that a wide range of approaches are being pursued, but they are inadequate to meet the need and suffer from severe limitations of several kinds.

Limitations on Effectiveness of Environmental Education Programs

Gerald Schneider, writing in American Forests[1], has recently argued that what he calls "conservation organizations" are failing to serve the educational functions of which he believes them potentially capable. He notes seven reasons for this failure, a few of which are to the point. He contends, for example, that the educational approach of conservation organizations has been too content-oriented and factual. "Process" and the attitudinal dimensions of environmental education have been given too little emphasis. There is, of course, a discussion within the environmental education community as to what constitutes a proper balance of emphasis on process and content in environmental education[2]. Schneider believes that there is too much content and not enough process in the environmental education efforts of environmental organizations and I agree with him. With some exceptions, these organizations have largely gathered the facts of an issue and presented them to their target educational population. Their assumption is that a clear perception of the facts will change behavior and will motivate people to act in their best interests, which is the best interest of environment as well. Educators are cognizant of the limitations of this approach to learning. Behavior change necessary to ease environmental problems must be deep and pervasive involving a change in lifestyle and value system. Simple presentation of the facts of an issue, without engagement of the learner in a process of interaction with the problem, will meet with limited success in solving the problem in any meaningful sense.

I believe that environmental education must lead to recognition of the utter necessity of deep and painful perceptual and value change in people, and factual emphasis on a problem is necessary but not sufficient for such change. Certainly there is a bias in our society toward the factual, the statistical, and people must have this information. But at the same time they must be confronted with the hard philosophical, moral and ethical questions beneath the surface of the statistics, and often they are not.

Schneider argues also that conservation organizations have failed to distinguish between education and propaganda, engaging too often in the latter at the expense of the former. They have, he contends, believed themselves to be arguing in the public interest while in fact they are arguing for their special interest. They do not allow examination of an issue on its merits but rather promote their side of an argument. Schneider suggests that conservation organizations should recognize that they are special interest groups, advocates of a specific minority viewpoint. There is not time to go into a lengthy discussion of this point, but it can be argued that the general goals of environmental groups are of public rather than special interest.

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1 Gerald Schneider, "Why Conservation Organizations Fail to Educate," American Forests, 4:1:4 (April, 1974); Also, "Why Conservation Organizations Fail to Educate--Part II," American Forests, 12:1:5 (December, 1974).

2 R. Thomas Tanner, Ecology, Environment, and Education, Lincoln, Neb.: Professional Educator's Publications, Inc., (1974), pp. 29-33.

Schneider nonetheless unwraps a significant problem for environmental organizations. Where lies the line between special interest and public interest, between propaganda and education? Is there, for example, any alternative for environmental organizations but outright advocacy of a specific cause like wilderness preservation in opposition to the interests promoting commodity production from all forest lands? This advocacy is their "raison d'etre." Who, in fact, is outside of a cause, of a "special" interest when it comes to the controversial issues of the environment? Are there really any dispassionate educators, interested only in the mental and moral growth of learners, able to avoid value judgments on issues and problems of the environment? There may not be many, and it is even in my view a legitimate question as to whether or not there should be such people in educational roles.

Can environmental organizations call their advocacy environmental education? I believe that it is consistent with the definition of environmental education presented earlier for them to do so. Developmental and commercial interests promote growth and consumption in so many effective ways that perhaps an essential role for conservation organizations is promotion of the stable and conservative alternatives to the prevailing norms touted by the "establishment." In this way a choice of alternatives may be perceived by the "learner," by the public, and recognition that a choice must be and is being made becomes clear. This motivates thought about choice rather than blind acceptance of a single course of action. This seems to be the path which environmental organizations have chosen to follow toward environmental education and is a necessary one.

Schneider, however, concludes that these organizations have wrongly believed this path (which in his view is representative of a bias) to be environmental education. Without using the word he hints that environmental organizations actually strive to "indoctrinate" people through skillful use of propaganda. This, he argues, is a major reason why these groups are unsuccessful environmental educators. People reject their doctrinaire approach.

There is another way of looking at the situation. America is a pluralistic society with a dynamic value orientation. It is founded on the belief that rational people can and will weigh the information they receive and make decisions in their best interest. Education is a process through which people acquire the skills and knowledge to make their decisions. Environmentalists are contributing very real perceptions of value to the educational process. They do not force people to accept their perceptions, but rather provide the opportunity for a dialectic to occur, out of which comes a new perception of things. Thus do environmentalists contribute to environmental education, even as the advertising industry does. This argument utilizes a broad definition of environmental education, but then in the end is not all education ultimately environmental?

Perhaps the major factors limiting the contribution of environmental organizations to environmental education are, from this perspective, the limits of their media and the refusal of educators to accept the environmentalist viewpoint as an important one. The environmentalist view of reality, lying outside the dominant view, is overwhelmed. How many times have environmentalists, upon viewing a very costly and effective advertisement of the petroleum industry, groaned at the inequity of resources available to promoters of consumption and to those of alternatives thereto. The environmentalist can only turn to his Audubon magazine or local newsletter to express his alternative to the view broadcast on television or laid out in a five-page spread in Newsweek. Even then the alternative only goes out to the one-tenth of one percent of the population already concerned enough to pick up this magazine.

A further limitation on the effectiveness of the educational efforts of environmental organizations is the spiritual and "soft" quality of many of their arguments. Ours is predominantly a "hard" and statistical society. I noted earlier that environmental organizations are perhaps occupied with facts and not enough with process. This factuality may be in response to awareness of the rational-statistical bias of the dominant thought processes in modern society. Inescapably a central issue to environmentalism is quality of life. People are working to define this "quality," and it is a hard but necessary task. Thoughtful people have pointed out that, while we may be able to survive in a completely technologized world, do we want to do so? Will we not be sacrificing essential qualities of humaneness? These are soft philosophical questions, a few among many such questions, that pragmatic men do not like to think about. In a world of progress, duality and shrinking time, resources cannot be afforded for such exercises. "Teach my kids to function, to succeed," argue the "back to the basics in education" advocates. "We don't have time for art, music, philosophy, environmental education." So it's on with the business of growth and success, and the "birdwatchers" stand outside the educational establishment looking in. My point here is that the issue of the meaning and value of the experience of living lies at the very center of environmentalism, has little to do with "success" as measured by gross national product and material success, and is thus rejected by many people, educators among them, whose vision is limited by the boundaries of a short-term pragmatism that we might call the "success syndrome." This limited vision poses a significant challenge to all environmental educators, but particularly for those operating from an environmental organization base.

I obviously disagree with part of Schneider's assessment of why environmental organizations fail to educate. While he argues that their failure is at least partly a consequence of their bias and their failure to distinguish special interests from public problems, I argue that their failure is attributable more to the limitations of their medium, outdated definitions of their educational task and equally dated approaches to it, and value judgments by "establishment" educators who, like Schneider, believe the conservationish view too biased and, therefore, refuse to give it a place in the curriculum.

Paths Toward More Effective Environmental Organization Participation in Environmental Education

What, then, can environmental organizations do to accomplish more effective environmental education? I can think of several actions that might lead to improvement of the situation.

1. They should recognize the central importance of environmental education for long-term solution of environmental problems. Environmental organizations operate of necessity with a "brushfire mentality," which dictates their priorities. Thus, they do not have time for educational approaches to environmental problem solving. They reason that education takes too long. I contend, to use the old cliche, that "an ounce of prevention is worth a pound of cure," and environmental organizations must balance their efforts to cure acute ills in the present with long-term preventative programs.

2. Discussion of the nature and function of environmental education should be launched within the conservation organizations on a broad basis. The power structure of an organization cannot just suddenly decide that emphasis will be place differently than previously, even if this were possible. Rather,

broad discussion of the issue in the environmentalist media nationally is a way to begin, with local discussion to follow. This is an approach that I am suggesting that the Sierra Club follow, an effort aimed at educating the membership about education and its place in the scheme of environmental things. If the membership perceives its importance, it will begin to work on environmental education around the country, in regional chapters and local groups, and the organization's effectiveness in environmental education will improve.

3. There is, in my view, a need to inject the environmentalist viewpoint more directly into formal educational processes. Certainly this is a difficult and controversial matter, but it seems essential. Such insertion may occur in a number of ways: through gaming and simulation, values clarification, moral development exercises (Kohlberg), case studies and other techniques. In order to do this it will be necessary for conservationists to sit down with educators and discuss some of the thorny issues raised by Schneider and by myself earlier in this paper. A great deal of work needs to be done here.

4. Following from this, conservationists must work more closely with the professional education community, particularly with those who are specializing in environmental education. There has, of course, been cooperative effort between such people in the past, but my impression, based on personal experience, is that much more exchange and interaction is necessary. Perhaps our efforts to find participants for this meeting is indicative of the state of things in this regard. All of the prominent national environmental organizations were invited to participate in this discussion, but could not come. One leader of such an organization told me that he didn't have time for these "technical" meetings. Such meetings have not, in his experience, been very productive. A pragmatic individual, deeply involved in political battles and current issues, he does not seem interested in working with "academics."

   The reverse may also be true. Many educators are hesitant to become associated with conservationists because their image of neutrality and objectivity will be tarnished. Further, they perceive themselves operating in a nonpartisan and value-free setting in relation to the issues and do not want to jeopardize this. Consequently they feel uncomfortable when approached by someone tainted with the environmentalist "bias." I think there is certainly need for a division of labor in environmental education. There is need for a separation of thought and action, but there is also need for cooperative effort. This seems obvious.

   Perhaps a positive step toward bringing these groups into more active cooperative ventures would be a conference, such as the major Earthcare conference that will occur in New York in June, the objective of which would be to explore the nature and function of environmental education, particularly from the perspective of the environmental organizations.

5. Environmental organizations should reassess the emphasis of the environmental education work that they are now doing. The effort is now overwhelmingly focused on nature. Nature education is important. Much good is done by focusing attention on the natural world upon which we are dependent and to which we are as a people so callous. Yet the world macroproblem goes so far beyond the appreciation of nature, and the love of wilderness. If we

are truly to solve the problems of overpopulation, pollution, resource depletion, unequal distribution of limited resources and such, we must, in the United States especially, engage in serious and painful discussion of lifestyle and of ethics. We must consider the underlying value orientation of our society and recognize within it the seeds of our problems. Then we must work to change that value system.

The necessary reassessment is something that must be carried out within the organizations involved. Audubon, for example, must come up with ways and means to complement its exceptionally fine nature education programs with others focusing on the difficult social and ethical problems that underlie land degradation and species extinction. They must make the editorial decision to carry articles about these controversial questions alongside the beautiful layouts on whales, ospreys and strip mining. I am not, I want to imphasize, criticizing what Audubon and the other organizations are currently doing, but rather calling for an expansion of the scope of their concern. In some ways I think the problems of the present have outstripped the policy makers of some of these organizations.

While discussing emphasis it might be well to raise also the issue of the composition of the environmental organizations. While most of the people and many of the environmental problems reside in urban settings, the conservation organizations are largely white, middle-class and suburban in the composition of their membership. Cost of membership has been rising recently, and the urban poor can ill afford the cost of even joining Audubon, the Sierra Club, or Friends of the Earth, even if they wanted to (which they don't). I do not know what to do about this problem, except perhaps to shift some of the emphasis of the organizational activity away from the nature preserve and wilderness area toward the urban area and its problems. Yet I think this membership issue is an important one because environmental education must be a process which reaches the people. A large part of the people live in urban areas, and if conservation organizations do not speak to urban dwellers, their educational effectiveness will be thereby severely limited.

In conclusion I wish to reiterate that I believe environmental organizations have done much good work in environmental education over the years. There is much more that they can do, and this may require reorientation of thought and priorities within these organizations. It will also require dedicated efforts by those within the environmental education "establishment," such as the membership of the National Association for Environmental Education, to recognize the potential I have described and to work toward realization of it. I think the idea of synergy is useful in visualizing the outcome of such recognition. If environmentalists with their ideas can join with educators with their theories and methodologies, the outcomes will be greater than anything either group can accomplish separately. I am hopeful that this can and will come to pass.

THE CONSORTIUM AS A VITAL STIMULUS IN DESIGNING AND INITIATING STUDIES OF THE ENVIRONMENT

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The College Center of the Finger Lakes (CCFL), located in Corning, New York, was founded in 1961 to explore ways in which its member institutions might construct innovative programs by the sharing of resources. It is one of the oldest of the voluntary consortia in New York State with its current membership consisting of Alfred University and Cazenovia, Elmira and Hartwick Colleges. By mutual consent, effective programs have been instituted in Graduate Education, Cooperative Admissions, Faculty Development and Environmental Studies. The environmental program is the one which most appropriately lends itself to discussion on this occasion.

In 1965, the CCFL acquired a federal surplus 65-foot harbor buoy tender which was named the Lake Diver IV. The vessel was berthed on Seneca Lake at Watkins Glen, New York, and used for the conduct of research relative to scuba diving and its physiological effect on the diver during periods of prolonged submersion. In 1967 the consortium acquired the use of a shore and docking facility on the west side of Seneca, leased from Dr. John Allen. With these two acquisitions, the CCFL colleges established the Finger Lakes Institute for educational and environmental research. Consortium members have access to the facilities on a time-shared basis with contractual affiliation available to non-members.

The Lake Diver IV was rigged and equipped to perform aquatic investigations at depths of 600 feet, analagous to those conducted on the continental shelf. The shore facility was refurbished to provide both dormitory and laboratory space. Courses and investigations were originally confined to the summer months but are now conducted virtually year-round. The facilities were made available to secondary schools, children activity groups (e.g., boy and girl scouts), and service organizations -- always with planned programs and proper supervision. Efforts were made to cooperate with organizations, both public and private, interested in environmental protection.

From 1967 to 1971, the summer aquatic programs were supported through grants from the National Science Foundation and other agencies. The Allen property has been acquired by the CCFL and now has separated laboratory and dormitory buildings and a new 70-foot dock. Studies at the Seneca Lake facility have included the basic limnology of the lake, its fresh water vertebrates and analyses of residual DDT in the bottom sediments of its southern portion and the adjoining marshland. In addition, a facility for terrestrial studies has been made available at the 1,100-acre Pine Lake preserve of the Hartwick College, located in the foothills of the Catskill Mountains.

In 1970 the consortium received an inquiry from the Bahamian Minister of Education concerning the possibility of a joint educational program to be conducted at a former U. S. Naval installation on the Island of San Salvador -- the first landfall of Columbus in 1492. After some preliminary exploratory talks, an agreement was reached to try such a program. Beginning in January 1971, with a few courses, the curriculum now offers field projects from December through May on San Salvador and other outer islands as well. Over the past four years the Bahamian program has expanded to 19 faculty and 300 students representing 64 institutions engaged in 21 field projects from Archaeology through Zoology. Studies are organized around the theme of understanding man-land-sea-history relationships. The CCFL provides research results to the Bahamian Government for both information and planning. Some 15 Bahamian students per year have tuition scholarships at consortium member colleges.

The programs described above demonstrate that a meaningful level of achievement for environmental problems can be accomplished through the concept of the consortium. Properly organized and executed, the concept can benefit not only its members, but society at large as well.

GENERAL TOPIC: THE ENVIRONMENT

GREENING TO GANGRENE - A PERVASIVE MORTAL EVIL

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The human organism is a remarkable being. The physiological and psychological nature of man has been the source of endless studies, and seemingly, the more we know about him, the less we know. If we begin with the human sense perceptors (seeing, hearing, smelling, touching, tasting, and moving) we can recognize our individual mechanisms for interpreting our environment. A particular sense is more keenly developed in some people. For the artist it is perhaps the visual sense; for the musician it may be the auditory sense; for the cook, the olfactory sense; the craftsman, the tactile sense; for the wine taster, it may be the taste sense; and for the athlete it might be the kinesthetic sense. The kinesthetic perception is the individual interpretation of the sensation of moving. We become so accustomed to ourselves and move so automatically that we have a tendency to forget about our complex selves.

It is difficult to conceive that "during the last 24 hours your heart beat 100,800 times pumping over 4,000 gallons of blood. Every second 10,000,000 red blood cells were destroyed and replaced. You breathed 23,240 times absorbing 20 cubic feet of oxygen and giving up 20 cubic feet of carbon dioxide. Your eyes registered at least 50,000 images on your brain and your eye muscles moved your eyes 100,000 times. You ate 3½ pounds of food and drank or consumed several gallons of water or liquid. You walked 20,000 steps and if you keep this up by the time you're 80, you will have walked enough to travel 6 times around the earth".[1] The simple fact is, man is an extremely complicated machine, dependent on and interacting with the many resources of the earth, for man is of the elements of his earth. But man is slowly being invaded by environmental health problems, many of which are of his own making. Although he is able to modify his senses to the degree that he adapts or seemingly copes with these pollutions, does he really? Let us take a look at some of the less common environmental hazards that could become man's own undoing!

People Pollution

To understand oneself is to understand another. To understand another is humanness. When, however, during the course of a day do we find the privileged time to understand self?

About the only commodity that is not on an increase is time with self, totally void of any outside interferences.

The dehumanizing effect, overcrowding, is already being felt in our cities where life doesn't seem to have as high a value as it once had. However, overcrowding is only one aspect of the problem. The other involves the production and disposal of waste created by the population. It is estimated that the waste produced by the United States alone is equivalent to 102.2 billion people, when including the waste of the energy-slaves which we continue to add to the list of our needs.

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[1] "You Busy Body You", Listen, October 1969, Irwin Ross, Ph.D.

In supporting one individual in our society, about 25 tons of material of all kinds must be extracted from the earth and processed each year.

Ten years ago 2,500 abandoned cars were towed away from New York City streets; last year the number was 50,000.

We are not only faced with disposing of 250 million tons of waste each year, we are also faced with using up our natural resources in the process.

America, with only 6 percent of the world's people, is using 40 percent of the world's resources.

It will be very difficult to convince a young person entering the reproductive years that he really is contributing to a threat of future well-being of man. A current controversy over the right to life has caused a dilemma over whether a female should be allowed to abort. Extreme psychological pressure is being placed upon the women. It is almost as if the fate of the world is in her hands. Not only is education necessary for the young, but so is a re-education for the old. How many grandmothers and parents are inflicting upon youth their value judgements? Youth, in seeking alternatives to past patterns, are often condemned, resulting in psychological factors which may cause a need for an escape through drugs or other self-destructive means.

There is a sharp difference in current fertility levels between the developed and the less-developed countries. The historical record indicates that even where family planning services are available, human fertility does not significantly decline. An international effort to satisfy basic social needs is essential. If fertility is to be reduced, average fertility in some societies will have to fall well below the death rate.

Systematic simplification of lifestyles in rich countries could free resources for helping the less-developed countries solve their basic economic and social problems. There must be positive inducement for limiting family size. At present, worldwide expenditures on family planning amount to less than $3 billion per year, compared to military expenditures of $200 billion per year.

In facing a world crisis in humankind, major world religions will have to resolve doctrines regarding abortion and birth control. Political leadership within both developed and underdeveloped countries will need to provide their peoples with education, health services, and a more equal distribution of the wealth between the haves and have-nots. The problem is global. What each individual does affects all peoples.

Mental Pollution

A healthy mind is one which can function freely and which is capable of making wise decisions. However, environmental disturbances affect the mind with varying results. A very powerful influencing factor involved in the breakdown of man as a thinking being has been the introduction of mass-media (television) and the "Madison Avenue Hard-Sell" (advertisement) approach. Man is not thinking for himself; he is allowing himself to be told what to think. Granted, exposure to the varieties of communication can broaden man's experiences, provided he can determine facts from fallacies, but man is following blindly. He becomes less and less able to distinguish that which is essential for survival, let alone for happiness. The lack of well-planned transportation systems results in bumper-to-bumper traffic carrying frustrated drivers at a snail's pace in super-

engine autos; all the no-no's from the time one is born have a bearing on decision-making, the innumerable selections of worldly possessions must continually be made, all of which are just a little more expensive than our neighbor's, or what we can really afford, and they affect the direction of our lives and interrelationships with others.

The adaptability of the human animal finally reaches a level of intolerance or inhumanness. For example: Although Los Angeles has the third highest crime rate in the nation, its problems do not really concern us (except perhaps for brief periods of time, as in the case of the 1965 Watts riot, the 1968 Kennedy assassination, and the more recent Tate-La Bianca murders and SLA shootout). Is your city on the drawing board to become this kind of city? Or is it already?

We know the overcrowding of rats causes psychological and physical changes in them. What about the overcrowding of man? We know that rats breathing dirty air prefer alcohol over water to wash down their food. What affect does dirty air have on us?

We do know that the higher the number of negative incidences in one's life, the greater the potential of mental illness.

How many no-no's did we exchange today with other human beings?

Surface Pollution

California alone can expect three million acres of open space to disappear by 1980 under the searing progress of growth. The myth is that the need for park and wilderness increases at the same rate as the population, when actually the need increases even more rapidly due to increased leisure time. Even with 1,200 miles of California coastline, it becomes more and more difficult to find a place to surf, sun, or swim.

A four-lane highway consumes up to 50 acres of land per mile, preferably the choicest land which minimizes construction costs. There is already more paved land in the United States than there is total land in the State of Georgia. Forty-four percent of total ground area in Los Angeles alone is committed to the automobile.

We have lost perspective in allowing city lights to out-twinkle the stars; allowing high-rise buildings to hide the hills, oceans and mountains; and allowing artificial lakes and concrete rivers to replace natural waterways.

Visual Pollution

In practically any city one cannot walk two blocks without seeing 40 signs or billboards, each obstructing the view of the next. Store fronts are camouflaged with painted signs advertising bargains which do not exist. Stringers of flags wave over car lots, drive-ins, and supermarkets; signs twirl, lights blink, arrows point and colors compete. Graffiti marks the walls, paper litters the gutters and grit covers the sidewalks and streaks the windows. Communities no longer have their identity of local market, local bakery or local restaurant, but have joined the look-alike chains with the taste-alike food and impersonal attitude. Erratic planning finds a lovely church flanked by a dry cleaner on one side and a "Sloppy Burger" on the other. If one does a good business, then

one on each corner should do better, but gas stations, chicken fried take-outs and fish-and-chips come and go by the score.

It is no longer a question that when we have a crisis something will be done. We are tampering with our natural habitat in such ways that will eventually destroy all of its life-giving qualities. H. G. Wells said, "Human history more and more becomes a race between education and catastrophe".

The rational fallacy somehow pictures this as a reasonable world full of concerned people who are doing their best for all of us. Whereas, we are treating our earth poorly, we are treating each other poorly, and we are treating ourselves poorly.

It may well be that our next generation of children will go to bed on such nursery rhymes as:

Ladybug, Ladybug, couldn't fly home
For the forest became a freeway
And her house was filled with Ozone

There was an old woman who lived in a shoe,
She had so many children, she didn't know what to do.
There was a young woman, her name was Sue
She'd read Paul Ehrlich, and she knew what to do.

Jack be sluggish, Jack be slow,
The air's so bad, the candle won't glow.

Hi-Diddle, diddle, the cat and the fiddle, the cow
couldn't see the moon;
The little dog cried with the smog in his eyes, and
The dish just sat down with the spoon.

Mary, Mary, quite contrary, how does your garden grow?
With DDT and other pesticides, that soon to the river
will flow.

Little Miss Muffet sat on a tuffet, eating her curds
and whey,
Along came a spider, and sat down beside her.
She learned about ecology today.

Little Robin Red Breast, you used to fly out there.
Now I cannot see you through the smoggy air.

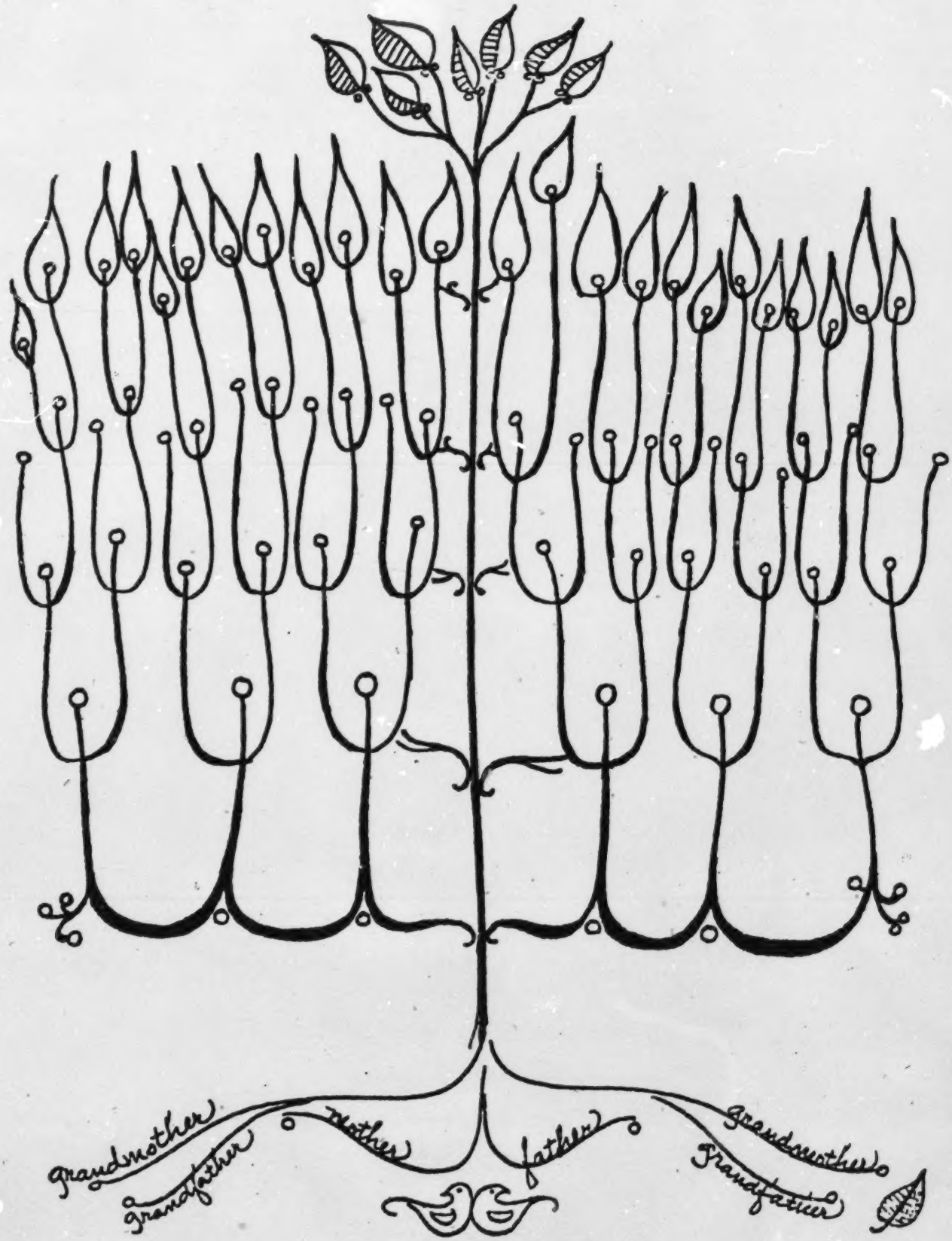
I would like to close with some quotes and some thoughts worth considering.

Rene' Dubos states that "Ecological systems can develop tolerance but in the process they tend to lose their rich complexity and stability. Technological accidents do not destroy all life, but create undesirable conditions. Social adaptability can have disastrous effects in the long run. Tolerance to pollution, crowding, noise, etc., must usually be paid for at a later date in the form of physical and mental misery". He goes on to say, "A design for living that would provide the opportunity for invigorating walks in a pleasant and unpolluted atmosphere would contribute more to physical and mental health than any concern with availability of elevators, moving platforms, mechanical hearts, and psychiatric care".

Barry Commoner feels that "Once the scientific evidence has been stated, or its absence made clear, the establishment of a level of tolerance for a modern pollutant is a social problem and must be resolved by social processes". He also feels that "The separation of the laws of nature among the different sciences is a human conceit; nature itself is an integrated whole...the age of innocent faith in science and technology may be over. A new conservation movement is needed to preserve life itself".

Dubos understands that "The humanness of life depends above all on the quality of man's relationship to the rest of creation -- to the winds and the stars, to the flowers and the beasts, to smiling and weeping humanity".

SHARE THE "LIVING PEOPLE TREE" AS A CATALYST FOR PROVOKING THOUGHT AND HOPEFULLY ACTION.


grandmother
grandfather
mother
father
grandmother
Grandfather

THE LIVING PEOPLE TREE

Each human being identified on the "Living People Tree" has certain attitudes and behaviors, and you in turn have developed either consciously or subconsciously certain attitudes and behaviors towards each of them, or through them.

Below is a brief list of words to trigger off some areas of thought relative to attitudes and behaviors. You may also want to add some to the list.

Depending upon the amount of time, you can select one or more individuals you placed on the tree, and by each of their names, using the letter key preceding each word, characterize each person using one or more words from the list. After each key place a plus if you consider it a strength or a minus if you consider it a weakness of that person

ATTITUDE AND/OR BEHAVIOR--key word list		MAY WANT TO KEEP IN MIND
key*		
AQ	Air Quality	Are attitudes and behaviors congruent?
CP	City Planning	
E	Energy	Is the person a resource for you?
EA	Environmental Awareness	Can you depend on the person?
EE	Environmental Economics	
FP	Food Production	Are you a branch of a "Living People Tree" that is making a positive and purposeful contribution to the family of man?
LU	Land Use	
PC	Population Control	
R	Recycling	
T	Transportation	
W	Water Quality	
O	Other	

Pair off with someone, preferably someone you do not know and each take a predetermined amount of time to describe one or more individuals using the keyed word or words as the catalyst for discussion.

*Based on Man and Environment for Secondary Schools
NAEE Publication

A MYTH FOR THE FUTURE

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"When it is dark enough you can see the stars." - Charles Beard

"Mightier than an army is the power of an idea whose time has come." - Unknown.

In a time of transition such as we are in today, the above statements provide both encouragement and hope for the future. In today's times, what has been held sacred and important in the past begins to seem irrelevant. With few guidelines for the future we tend to cling more firmly to what has worked in the past, even though the evidence is overwhelming that the past may no longer be viable. McLuhan suggests that we are traveling down a super highway at 100 miles an hour with our eyes fixed on the rear view mirror.

Historically, powerful new ideas have been borne out of such times. However, in most cases, the culture which gave birth to the new idea was not flexible enough to contain it. The initial result was repression, but in time, the new idea burst forth and took form in ways that eventually changed the world. Judaism was not flexible enough to contain Christianity, which burst forth to become a power that changed the course of history. Medieval Europe could not contain the winds of individual freedom, and this freedom became the cornerstrone of a new nation founded on and dedicated to the proposition that "all men are created equal". Eventually, the entire world has felt the impact of this idea, an idea which is still creating ferment in the so-called Third World.

As we approach the end of the 20th Century and the 200th anniversary of the revolution which gave form to the new ideas of freedom and human dignity, the night has again become dark. The viability of the institutions which so effectively brought to flower the ideals of the American Constitution is in question by increasing numbers of people. The values embraced in early American history and proclaimed throughout the world seem to bring neither peace nor hope as they did two hundred years ago. The values epitomized by the "Puritan Ethic" are challenged daily in our country, not only by youth, but by solid, middle class America. Something has gone stale in our society, and even the most optimistic politicians grudgingly admit that something is wrong. Like people whistling in a graveyard, we continue to mouth the old cliches to bolster our courage and to ward off the darkness.

It is out of such times that new ideas can be borne, new ideas which can capture the imagination and spirit of an entire nation, or perhaps in this day of instant communication, an entire world.

Rollo May, in an address to the annual conference of the American Association of Higher Education in 1969, spoke of the idea which made American great as the "myth of the frontier". It was this idea or myth which brought our forefathers across the ocean, thrust civilization across a continent and spread the idea of human dignity around the world. The myth of the frontier was the integrating concept that epitomized important values: freedom, human dignity,

independence, individual initiative and hard work. The myth was viable as long as there was a physical frontier which could give a ground of reality to it. However, with the passing of the frontier the myth began to lose its force and power, and today, May would suggest, the myth can no longer sustain us. The time has come, he suggests, to discover a new myth: one which will give meaning to the world for the next stage of human development.

I suggest that the idea whose birth pangs are now upon us - an idea which could become the integrating concept of the 21st Century - is the concept of the spaceship first made popular by Buckminister Fuller. The "myth of the spaceship" could replace the "myth of the frontier" and could provide both motivation and power for the next century. For most people the idea of Spaceship Earth is still little more than an intellectual reality - a fact which we know, but which has no power in our lives. A myth is viable for a culture only when it has a visceral character, when the life of the culture is caught up in the power of its idea. For those who crossed the ocean to found a new nation and for those who continually pushed the frontier westward, the myth of the frontier has such a visceral character. It was people such as these pioneers who gave true power to the myth and who, in turn, received power from it.

The myth of the spaceship has already been accepted viscerally by a few, though an increasing number of "average" Americans are beginning to understand its implications. Though the forces of institutionalized power are as resistive today as were the European power structures in the 17th and 18th centuries, the crises faced today on a worldwide basis will force acceptance of change far more rapidly than in the past.

What are some of the implications of the spaceship myth?

Just as the myth of the frontier called forth and integrated the many values of 19th and 20th century America, the new myth can call forth and integrate a new constellation of values for the 21st Century, building on those values which helped us grow beyond the frontier, but reshaping them to meet the needs of a new myth. The frontier myth was essentially one that encouraged expansion and growth. It brought forth the necessary value structures of freedom, independence, and individual initiative which made the myth a reality. The spaceship myth encourages ecological living with its concommitant values. Ecology provides basic concepts and principles to undergird this new myth. I suggest that the primary concept of the new mythology is interdependence, the most basic of all ecological principles.

The concept of interdependence reinforces the fact that everything on Spaceship Earth is related to and dependent upon everything else. That this concept holds true for natural ecology has long been known by scientists, although the more profound implications have had limited impact upon pragmatic scientific thinking. In spite of an intellectual recognition of the concept, scientists often continue to pursue their research in narrowly defined fields, unable to recognize, much less to utilize, the interrelatedness of all research. Barry Commoner has clearly recognized this fact and speaks to it in his book, The Closing Circle. He gives many examples of how research in one field provides answers to immediate problems, but when applied, creates far greater problems in other fields originally thought to be unrelated. The discovery and widespread use of DDT illustrates the point most simply.

Garrett Hardin in his perceptive article, Tragedy of the Commons, understands this concept and has coined a phrase which could become the motto of the spaceship mythology: "You can never do merely one thing".

The concept of interdependence is, however, relevant to far more than natural ecology. Its relevance is to everything that happens on this spaceship including social, economic and political decisions. Everything that happens, every decision that is made, will have inevitable and innumerable consequences. Man's inability to comprehend the extent of this concept need not justify his ignoring the validity of the principle. Rather, it must provide a basis, to the greatest extent possible before we act, upon which we consider the implications of each decision made. The concept calls for a retreat from "tunnel vision" and from crisis decisions based on immediate and pragmatic needs without regard to implications for either the future or for the impact on other areas of life.

The concept of interdependence is radically different from the concept of expansion and growth which characterized the frontier myth. It suggests an entirely different approach to life and culture and has profound implications for every area of man's life. The attitudes, values and behavior of those committed to spaceship mythology will be vastly different from the attitudes, values and behavior of those who continue to live according to the frontier myth. A new mythology demands new systems, new values, new structures and a reordering of society, because the old forms were not built to contain or express a new mythology. The New Testament parable of the old wineskins and the new wine speaks to this very point. Just as feudal society was not capable of containing the changes that resulted as the myth of the frontier captured man's imagination, neither can industrial society as we know it today contain the changes that will result as man's imagination is captured by the new mythology.

The implications of this change will produce both anxiety and hope. Change always produces anxiety, for the future is never certain and the old ways are comfortable - particularly if the new ground rules are not familiar. On the other hand, a time of change can produce hope. When old institutions begin to crumble and the old values provide no significant answers, man looks for something new that will serve and satisfy. The possibilities of a new mythology offering new insights, new approaches, and new answers can provide the same challenge and hope with which our founding fathers approached the building of a new nation.

In order to understand the nature of changes that may occur, let us briefly trace the lot of the common man from the feudal society into a spaceship society. Feudal man was a serf, little more than a slave eking out a mere existence on feudal estates. With the onset of agrarian reform followed by the industrial revolution, vast social, economic and political changes took place. Man's entire value structure began to change as the new values necessary for a different society began to emerge. Forces of individualism, independence, human dignity, individual initiative and responsibility swept through the western world. Because feudalism could not contain them and because the frontier was open, they became the cornerstone of a new nation. The "Puritan Ethic" embraced those values necessary for the opening of the frontier and the building of an industrial, capitalistic society. Virtues such as competition, hard work, private property, and "a day's wage for a day's work" replaced the virtues of a feudal society. The concept of "all men created equal" paved the way for the unique power of individual endeavor resulting in the rapid growth and expansion of the United States and the capitalistic system. Thus, the dependency of the serf became the independence of the free citizen, for it took this independence to overcome the vast hardships of frontier life and capitalize on its possibilities.

Independence is the basis for virtually all of the values cherished by this society: the free enterprise system, public education, pluralism, our political

system, social mobility, private property, expansion and growth. Independence has made America great, and this influence has spread to the entire world.

Just as it was necessary for independence to grow out of and beyond dependence, in the spaceship age it will be necessary for interdependence to grow out of and beyond independence. Interdependence is possible only after independence has taken place, for by its very definition, it implies the interrelationship between two independent objects. Thus, interdependence does not negate independence, but rather emphasizes the rechanneling of independence. It expands the parameters of cooperation vis-a-vis with competition and emphasizes concern for the common welfare over striving for individual success.

Spaceship ethics are different from frontier ethics. The challenge for us who stand in a time of transition is to discover or create models of a just societal life based on a set of values which will make life both viable and satisfying in the future. Unless we can clearly understand that spaceship economics differ from frontier economics; that spaceship politics differ from frontier politics; that a spaceship society differs from a frontier society, we will continue to think of the future only in terms of the past. At present, almost without exception, our political leaders are doing just this. Every solution suggested for the present economic crisis has been made in terms of past, frontier economics. The responses to the energy crisis are essentially in terms of frontier values: increase our exploitation of present fossil reserves as rapidly as possible and enhance the competitive edge of our nation in the world. While some traditional responses will be necessary to carry us through a stage of transition, it is imperative that first priority be given to the search for new models based on the reality of spaceship life.

Dr. Jerrold Zacharias has defined education as "the raising of questions worth arguing about". While not a primary thrust of current education, this definition must become a major component of education for the future. Instead of training youth for jobs that may be obsolete by the time they graduate, we must educate them to raise the fundamental questions about our society and its future.

Some questions worth arguing about which have not been seriously considered on a national level, are ethical questions which challenge the relevance of frontier ethics for the future. For example, can we ethically continue expending vast amounts of energy and resources in producing automobiles and other programs that have planned obsolesence built into them? Can we ethically continue to exploit our non-renewable resources while still creating vast waste piles of junk? Can we continue to encourage individual initiative in creating products that have no intrinsic worth other than that someone will buy them? Can we continue to allow limited land to be exploited for wasteful housing developments or for vast expanses of highways with little concern for more economical mass transportation? Can we afford to stifle individual creativity by employing millions of our citizens in uncreative, unimaginative occupations as exemplified by the assembly line? Can we continue to encourage increased use of electricity, gas and oil by decreasing the cost of fuel as the amount used increases? Can we afford to continue a democracy in which the average citizen can exercise his political rights only once every four years? Can we afford to allow poverty to continue at any level as long as some people in our society receive six-figure salaries? Can we continue to espouse full employment and base our economic system on it when automation makes full employment impossible?

These questions are not a condemnation of past values. Industrial capitalism has brought us where we are, and though it has not been a smooth trip, few would honestly wish to return to a feudal society. The past has been good to

to us. The values which our forebearers held dear have provided incentives for all mankind. However, the frontier values of the past will not be viable for the "spaceship" life of the future.

Some models are being suggested for the future. Rexford Tugwell has proposed a new model for representative democracy. Robert Theobald has suggested what he calls the economics of abundance rather than the frontier economics of scarcity. The United Nations model, fragile though it may be, offers an introduction to the reality of the interdependence of all nations and represents a step toward spaceship politics. New organizational models are being tried on a limited scale to encourage synergistic decision-making, thus encouraging the move from autocratic authority to what Theobald calls sapiential authority. New educational models are encouraging creativity and problem-solving and are recognizing that education is a life-long process. New family models are being explored by writers like Robert Rimmer and experienced with by many young people - models which encourage expansion of intimacy and increased interdependence in larger family units. People today are writing about leisure as though it were a value in its own right rather than simply an escape from work. Industry is considering shorter workweeks. The natural environment has improved in the past few years as people recognize some of the demands of ecological interdependence. Already the movement is underway.

In the spaceship, human and ecological values must be paramount. Man must learn to live in harmony with his total environment, an environment which includes other men, machines, ideas, feelings and culture as well as the natural world around us. Interdependence is essentially harmonious. It must be for survival depends on it!

We are living in a world of transition, and the times are not easy. Millions are suffering and dying; national and international economic policies provide neither reassurance nor basic sustenance. The U. S. Secretary of State is constantly on the move trying to keep the seams of the world from falling apart. People are restless because they hear only the shibboleths of the past. In these days, there is genuine danger of discouragement. The night is dark, but the stars are shining. It is our fervent hope that the stars shine to welcome the birth of a new idea whose time has come.

ENVIRONMENTAL POLICY IN THE CURRENT ECONOMIC RECESSION

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There is no doubt today that the United States is undergoing what is likely to be its most prolonged and severe economic recession since World War II. Some knowledgeable people are even talking about the prospects for an extended 1930's type depression. However, I personally doubt that our current recession is the first phase of a prolonged depression. What appears to me to be more likely is an extended period of adjustment in the economy to the realities of changes in the costs of obtaining virtually all of the natural resources used by our industrialized and urbanized society, and in the costs of using our polluted natural environment to dispose of the increasingly dangerous wastes of our "modern" technologies.

Our current recession is also accompanied by an exceptionally high rate of price inflation. Until recent years, most economists would have attached a very low probability to the prospect of a sustained sharp recession combined with relatively high rates of price inflation. The excess supplies of goods and services which accompany recessions would be expected to rule out price increases and generally to lead to declining prices, especially if the recession lasts for more than a few months. But these economists believed that goods and services are produced under conditions of approximately constant "real" costs; that is, costs measured in terms of the physical capital and labor used to produce them. In my opinion, the present inflation is simply the only way the economy, given our present economic and political institutions, can adjust to the realities of declining productivity with respect to marketable goods and services.

If the nation's money supply had grown at historically high rates over the past couple of years, economists could maintain their constant costs hypothesis and attribute the present combination of inflation with recession to a large excess supply of money. But, this position is not borne out by the facts. Money supply growth rates have not been at historically high levels for some time and presently are at relatively low levels when compared to the money supply growth rates of past inflations. I do not rule out monetary factors as significant contributors to our present inflation; rather, I am asserting that they are not the most important reason for our present economic problems.

There are, of course, many other possible explanations for our present situation of inflation with recession, including the inflationary price expectations model which I feel has considerable relevance for our present situation. But, I feel that the most reasonable fundamental explanation is to found in the real costs (capital and labor) of natural resource commodities and environmental protection. That is, until sometime in the 1960's, the real costs of using natural resources (including energy and the environment) had been either roughly constant or declining for about 100 years. In about the middle of the 1960's, this long-term cost stability ended, to be replaced by sharp increases in the capital and labor which must be expended to produce or to import one physical unit of many natural resource commodities. These cost increases are primarily due to the increasingly depleted state of our more accessible and higher grade fuel and mineral deposits, the over-intense use of our farm lands and the need to clean up our polluted

environment. In addition, the new technologies of the past fifty years which have been offsetting the effects of natural resource and land depletion are now being identified as the major sources of many of our most serious pollution problems and health hazards.

I do not have enough time to give a broad range of examples illustrating these points and to give substantial evidence with respect to why these real costs are unlikely to stop rising for at least the next few years. The case of the energy resources is probably the most familiar, but there are other natural resources which are subject to rising real costs of similar magnitudes: Most importantly, food and metals.

The almost four-fold increase in the cost of imported oil has been a major component of our rising energy costs. In terms of real costs, the rise in the price of foreign oil means that the U. S. must export considerably more of its capital and labor to purchase a barrel of oil than it did five years ago. With the money incomes of both the workers and the capitalists still rising, it means that more money will be purchasing fewer goods; hence, their prices must rise. In 1960, or even in 1965, such a rise in the price of imported oil would have had little impact on the U. S. economy, since we had more than enough surplus oil producing capacity to meet all of our nations's demand for oil for a long enough period that the economy could adjust smoothly to sharply higher prices for oil.

However, by 1970, the surplus producing capacity of the U. S. oil industry had virtually disappeared, and with it went the ability of the U. S. economy to adjust smoothly to sharp increases in the price of foreign oil. Increases in the domestic supplies of oil and other energy resources sufficient to reduce oil imports to relatively low levels can now be obtained only at the expense of sharply higher real economic costs or of increasingly unacceptable environmental impacts. To put the matter bluntly, by following well-intended, but economically stupid policies, the Kennedy and Johnson administrations traded the temporary euphoria of the soaring-sixties for what is likely to be a long, and painful period of economic readjustment which we are just beginning. And remember, oil is not the only natural resource which is having a considerable impact on the U. S. economy. There are others whose real costs of production have risen of which food is probably the most important.

Many influential leaders in business and organized labor place a substantial portion of the blame for our present economic difficulties on the environmental protection legislation which was adopted in the early 1970's. Although there is a substantial element of truth of their position, for the most part it is a "bum-rap" serving only certain powerful vested interests. To the extent that capital and labor are diverted from the production of consumer goods and services to protecting the environment, there are "inflationary" impacts. The owners of the capital and labor which are diverted to environmental protection receive incomes; hence, we again have the case of more money purchasing fewer goods and services, and the prices of marketed goods and services must rise. The resulting cleaner environment is a public good which is not bought and sold on the market; hence, environmental enhancement does not absorb any of the incomes which are created in its production (unless it is financed entirely by tax revenues). Moreover, because the benefits to society of a cleaner, safer environment cannot be measured in terms of money, our present materialistic society generally places a low value (relative to the value of obtaining more marketable goods and services) on a cleaner environment and our priceless biological heritage.

Granted that we could significantly reduce the costs of those energy-intensive goods and services (such as automobiles and thermal electric power plants) with the greatest impacts on the environment created by relaxing our environmental protection regulations, the question remains of whether it is in the public interest to encourage production of more of these goods. We do need the employment that automobile and electrical appliance plants provide; but with the exception of the most disadvantaged members of our society, I doubt that we really need the output of those plants. We certainly do need the output of industries which produce products contributing to cleaning up our polluted environment, to conserving our energy resources, and to rebuilding much of our housing stock. We need to devote more of our capital and labor resources to producing food-using methods which require far fewer of our energy resources and which enhance the long-term productivity of our most precious resource, our farm lands. And we certainly must protect our precious biological heritage from the dangers of petrochemical pesticides and most of the "miracles" of modern chemistry, and from the ultimate threat of radioactivity from nuclear power plants.

At about this point in my environmental economics classes, the economics majors begin to get rather uncomfortable. They are beginning to detect my committing the ultimate heresy: that of questioning the basic social goal upon which modern economic analysis has been based since Adam Smith published his Wealth of Nations in 1776. This social goal is attainment of the maximum possible value of output from our capital, labor, and natural resources, given (1) consumer preferences for goods and services, (2) the distribution of income and wealth, and (3) the state of technology. This goal, which is called "Pareto optimalty" in mystifying professional jargon (to borrow a term from Herbert Marcuse's One Dimensional Man), is taken as self-evident by my fellow economists, virtually without exception. Even socialists, with some reservations regarding the distribution of income and wealth assumption, use this goal in their economic analyses. Why shouldn't they? Both capitalist and socialist economics have a common heritage in Smith and the first generation of his followers.

Yet, the social goal of maximizing the value of the nation's capital, labor and natural resources only became today's premier social goal because its time had come in the two centuries between about 1750 and 1950. The period from roughly 1450 to 1750 was characterized by six dominant interrelated political and economic factors: (1) the opening of the vast natural and human resources of the "New World" to the exploitation of technically advanced Europeans, (2) the increasing rate of technical change and capital accumulation, (3) the new methods of organizing production made possible by the growing use of inanimate energy (i.e., the factory), (4) the larger markets opened up by lower cost transportation systems, (5) the relatively greater political stability provided by the growth of nation-states and greater urbanization, and possibly (6) the changes in Christianity (i.e., Protestantism) which facilitated the development of personal ethics favoring high rates of capital formation rather than luxurious consumption by those who could afford it.

Prior to about the fifteenth century, if we are to place any faith in the writings of such great minds of antiquity and the Middle Ages as Plato, Aristotle, the disciples of Christ, and Saint Thomas Aquinas, the primary social goal was that of attaining "social justice" -- as each particular author defined it. "Social justice" was the primary social goal because these and most other intellectuals of the day probably recognized the inherent limitations of their relatively stagnant economies. Prior to the fifteenth century, an increase in one man's wealth was likely to be at the expense of another's since a relatively stagnant technology, a fixed resource base, and the law of diminishing returns to labor imply

little, if any, economic growth.

In the early 19th century, it became widely recognized that the total wealth of society could grow at historically rapid rates if government would adopt the growth-promoting institutions implied in the goal of maximizing the value of the nation's capital, labor and natural resources. In the first half of the 19th century, it was believed that the per capita incomes of the masses could not rise much above subsistence. But, by the early 20th century, the American economic experience had shown that technical progress, economies of scale, and human and physical capital accumulation could increase national income at rates well in excess of the rate of population growth. By the 1950's and 1960's, economists had come to view sustained rapid economic growth and the social goal of maximizing the value of capital, labor, and natural resources as the gospel truth, right out of Revelations! Heaven, here on earth, and now, was attainable, even desirable, if we would simply follow the "right" government policies. From such thinking, the "Ugly American" was born.

Two hundred years of American and Western European economic history could not be misleading us - or could they? The American dream of material affluence has been attained to a degree far beyond that even conceived by the founding fathers of our republic. Yet, we must not forget the six dominant economic factors which I used to characterize the three centuries when the 'maximize the value of capital, labor and natural resources goal' gradually came of age and replaced social justice and the transitional stage of mercantilism as the dominant social goal.

Hence, the ultimate heresy. Are our present economic troubles, with inflation and recession, signals that the time has come to reconsider our basic economic and social goals, and even our personal lifestyle and goals? Is a high and growing level of environmental pollution by potentially highly toxic wastes from our energy-intensive industrial economy another signal that the precepts upon which an industrial lifestyle is based are no longer applicable? What about the rising capital and labor costs of obtaining a broad range of energy and other natural resources which have characterized the past decade or so, after roughly a century of constant or declining costs? What about the increasingly widespread loss of such basic amenities as privacy, quiet, clean air, natural open spaces, clear views of the mountains and sea and clean, safe cities? And, finally, consider the problem of rising human populations in a world where the capability of building and delivering nuclear weapons is becoming ever more widely available.

What does the above hypothesis about the appropriateness of the social goal of maximizing the value of our nation's capital, labor and natural resources have to do with the topic of this paper (environmental policy in the current recession)? I think that it really brings to the forefront the present leadership crisis now facing the American nation, and the world community, for that matter. The economic, environmental and energy policies now being proposed by the President and Congress are based on the presumption that the economics of the past two centuries are still appropriate today.

The traditional economic policies being pursued today by all levels of government are, at best, poorly suited to promoting adaptation of our economy and personal lifestyles to a world of increasingly costly energy, food and other natural resources, increasingly severe environmental pollution and more widespread losses of the amenities which make life worth living. Stimulating the production of automobiles and electrical appliances only increases the drain on our natural resources and the impact on our polluted environment, especially

when environmental protection policies are relaxed to stimulate their production. We need policies which will add to ordinary private property rights, the basic political rights of "life, liberty and pursuit of happiness" and such basic amenity rights as privacy, quiet, clean air and water, and access to natural open spaces. We need policies designed to redirect our economy towards the development, production and marketing of less energy - and natural resource - intensive goods and services; then we could solve both our unemployment and our environmental problems, For example, permitting the prices of energy and other natural resources to rise to their free market levels, and adding taxes to their consumption, are, in my opinion, excellent policies for reducing the consumption of energy - and natural resource - intensive goods and services and for encouraging the production of goods and services which economize on energy and natural resources. America, in short, needs more of that kind of inflation, not less.

We need to examine other social goals to use as guides in setting public policy and standards of personal achievement. There are enough ideas in the Western literature of the past 2,000 years and in the oral and written traditions of other societies (such as the American Indian) to stimulate the national and international dialogue. Four possibilities, which have been discussed recently in the literature, are (1) to minimize entropy (Boulding's "Space Ship Earth"), (2) to attain a balance between human and natural systems where each system contributes to the well-being of the other (the live-in-harmony-with-nature view of traditional American Indian cultures), (3) to preserve amenity rights (Misban's Technology and Growth), and (4) to obtain the maximum satisfaction from the least amount of resources (Schumacher's "Buddist Economics"). The more classically oriented among us should not forget the views of Plato, Christ or Aquinas on "social justice".

At their worst, the policies being proposed by big government, big business and big labor will only delay the adjustments in our economic and social goals until one or more parts of our highly specialized and interconnected economy breakdown under the stress of rising environmental pollution and natural resource scarcity, ultimately leading to the familiar collapse-mode graphs of the Club of Rome's Limits to Growth. Americans deserve more from their elected and appointed officials, yet the necessary governmental leadership does not appear to be forthcoming in this time of impending crisis. Americans have changed their lifestyle in the past, as when low-cost energy and new technologies made our present energy-intensive, materialistic lifestyle feasible and economic. We can just as easily shift from our present lifestyle to one which is more in tune with environmental realities, provided that we are given a reasonable period of time, say, a decade, to make the adjustments which in any event will ultimately have to be made. I think we have sufficient time to make the necessary adjustments if we start now.

The transition from an energy - and natural resource - intensive economy to one which places far fewer demands on the environment is much like the transition from a wartime to a peacetime economy. The recession we are going through today is much like the recession of 1946, after World War II. If we make the successful transition to an economy more in harmoney with the natural environment, rather than in harmony with our inhuman machines, we can again embark on an extended period of economic and social progress rivaling that of the 1950's and 1960's.

Living in harmony with the natural environment and in a world where involuntary exchanges of basic amenity rights are minimized does not imply a return to the brutish conditions of our distant past, but rather a new burst of creative,

adaptive growth. Only the inevitable social upheavals implied by the collapse of our present economic system would be likely to destroy civilization. Moreover, adapting our economy to the realities of limited natural resources and the need for a cleaner, quieter environment do not imply "zero economic growth", as most of the proponents and opponents of conservation so frequently assert. The adaptive process will be accompanied by economic progress defined in terms of the new social goals adopted by our society, although it will be of a substantially different nature than our past two centuries of economic growth.

In California, the voters enacted in November of 1972 an initiative entitled "The California Coastal Zone Conservation Act" which set the following basic policies for land use regulation in the state's coastal zone and established a strong administrative agency, the California Coastal Zone Conservation Commission, to see that these policies are carried out:

> "The people of the State of California hereby find and declare that the California coastal zone is a distinct and valuable natural resource...existing as a delicately balanced ecosystem; that permanent protection of the remaining natural and scenic resources of the coastal zone is a paramount concern to present future residents of the state and nation; ...that it is necessary to preserve the ecological balance of the coastal zone and prevent its further deterioration and destruction; and that it is the policy of the state to preserve, protect and, where possible, restore the resources of the coastal zone..." (Section 27001, Public Resources Code)

In addition, the Act mandates the following objectives for the California Coastal Zone Conservation Plan:

> "The coastal zone plan shall be consistent with all of the following objectives: (a) The maintenance, restoration, and enhancement of the overall quality of the coastal zone environment, including, but not limited to, its amenities and esthetic values, (b) The continued existence of optimum populations of all species of living organisms, (c) The balanced utilization and preservation, consistent with sound conservation principles of all living and non-living coastal area resources, and (d) Avoidance of irreversible and irretrievable commitments of coastal zone resources." (Section 27302, Public Resources Code)

This act is noteworthy because it does not require the Commissions to consider the economic impact of their actions - only their impact on the environment and natural resources of the coastal zone. The federal Coastal Zone Management Act, on the other hand, includes economic impacts in its statement of objectives. Given the present emphasis on economic impacts in making social policy, it is very likely that under the federal act, environmental and natural resource conservation considerations will simply put constraints on policy decisions primarily based on the social goal of maximizing the value of the nation's capital, labor and natural resources. The California Act, however, reverses the priorities by requiring that public policy decisions be made on the basis of amenity, environmental and natural resource considerations, with minimizing the economic costs of the policy decisions only serving as a constraint on the policy decision process.

It is too early to determine the success of the California experiment since the

act requires that the State Legislature evaluate the commission's actions in 1976. If the Legislature adopts and permanently institutionalizes the act's objectives through effective legislation, California's first steps toward adopting environmentally oriented social goals to guide public policy will be made. When added to the similar actions being considered or enacted in other states, we may be on our way towards a reassessment of social goals on a national level, which could well result in the development of truly effective, long-term and simultaneous solutions to our economic, environmental, and employment problems within the decade of the 1970's.

Those of us in the teaching profession bear substantial social responsibilities with respect to providing the leadership necessary to start America's transition to a new, progressive economy capable of attaining every greater heights of human achievement. We must provide the scientific knowledge of our present economy and natural environment which people will require if they are to understand the need for new social goals to replace our outmoded goals. And, we must provide the ethical basis on which to make the choices with respect to how to restructure our economy and our society.

Changes in individual attitudes and goals - which ultimately are perceived by and promoted by politicians seeking election and by business and labor leaders seeking greater wealth and power - must occur before America can redirect its energies and genius. It is the nation's educators who must provide the leadership so essential to adapting our personal attitudes and goals to the realities of increasingly limited natural resources and growing environmental pollution. Government, the media, business and organized labor basically can only reflect current views and attitudes, primarily those of the elite classes in our society. These institutions can do little with respect to changing the basic attitudes of the American people towards their lives and the world, as the twenty some odd years since the Supreme Court's Brown versus Board of Education decision so pathetically illustrates.

These are great responsibilities for the teaching profession, and to avoid them at this crucial time in our history would be totally out of character with our profession's past accomplishments.